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APPLICATION OF RADIOLOGY AND PHYSIOTHERAPY TO GYNECOLOGY: A SYMPOSIUM

Part III—Radium and Roentgen Therapy

RADIATION THERAPY IN CARCINOMA OF THE UTERINE CERVIX*

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THE radiologist treating deep-seated malignant neoplasms has a discouraging task. The poor general condition and lack of resistance of the patient suffering from cancer, the usual advanced stage of the disease, the impossibility of accurately outlining the size and extent of the growth, and the difficulties in technique of application of ray therapy are factors combining to render successful treatment unusually difficult. The radiologist has to force himself to be optimistic and to struggle against tremendous odds by increasing his skill in early diagnosis while he constantly strives to perfect his technique.

There is one type of deep-seated cancer, however, which does afford encouragement. The radiologist is always glad to present and discuss results in carcinoma of the uterine cervix. At first glance this is difficult to understand. Cancer of the body of the uterus, for instance, is relatively less malignant—slower to invade or to metastasize. But cervical growths can be more accurately examined and outlined; moreover, treatment can be applied directly to the disease and the effects closely studied with the naked eye and the tissue changes observed with the microscope. Furthermore, radiation therapy is just emerging from its infancy and cancer of the cervix was the first form of malignancy to be widely treated by this method, so perhaps the technique is further advanced than in the case of other malignant growths.

The development of ray therapy came as a great boon to sufferers from this terrible disease. Untreated cancers of the cervix do not heal and inevitably lead to a pain-

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ful death after prolonged suffering. Surgery, the only other alternative, yields a 10 per cent primary mortality and 75 per cent of recurrences in all cases, 60 per cent of these recurrences taking place within one year after operation (1). At the present time surgery is still the method of choice with many in early operable malignancies; but in borderline or advanced conditions radium and x ray therapy in expert hands offer infinitely more than the best surgery.

Even early operable cases are now judged best treated by radiation in preference to surgery by many gynecologists. Schmitz reports 205 early cases in five clinics with 40.5 per cent of five year cures (2), and Healy and Bailey record 50.4 per cent alive in a recent series of 335 patients at the Memorial Hospital (3).

There is an interesting quotation from Polak and Phelan's recent collective review of the literature:

"Of 100 cases of cancer of the cervix applying for operative treatment, at most only 50 can be accepted as operable, and of these 5 will die from the operation; so that of the 45 surviving the operation, but 14, or 30 per cent, can be expected to survive the five year period. Consequently, of the 100 cases, only 14 are alive at the end of five years.

"With radium, on the other hand, all of the 100 will be accepted for treatment, and of this number we can expect at least 15 to 25 per cent to be alive at the end of five years, with practically no primary mortality" (4).

TECHNIQUE

Careful examination, precision of dosage, care in application and experience are prerequisites in radiation therapy. Gamma radiation is a dangerous boomerang which if indiscriminately used may yield incalculable harm. Severe burns, proctitis, fis-

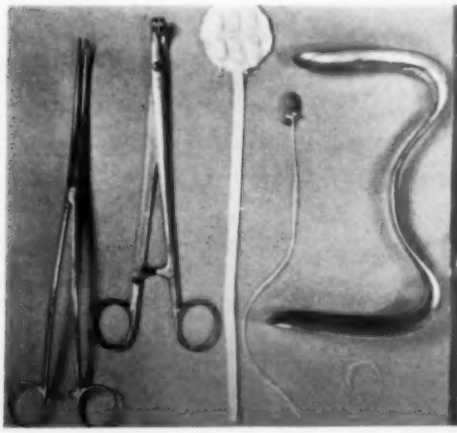

Fig. 1.—Instruments used in radium application. From left to right: dressing forceps; forceps with which to take tissue for microscopical examination; gauze plaque with six radium tubes for use against cervix; rubber cot containing a radium tube to be placed within cervix; Sim's speculum to expose parts with patient in knee-breast position.

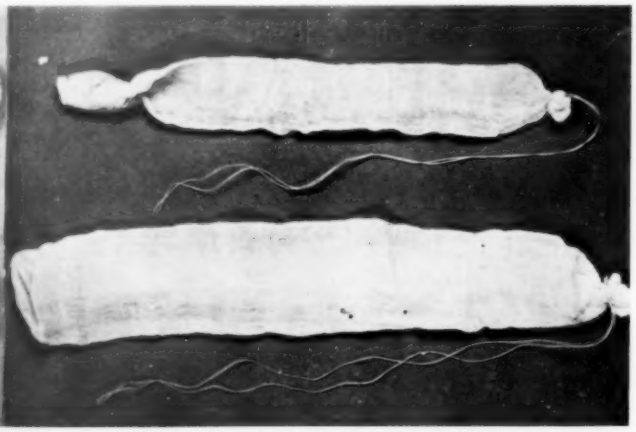

Fig. 2.—Gauze pack and lead filter of ¼ inch thickness wrapped in gauze, to be inserted between radium tubes and vaginal walls in order to protect rectum and bladder.

tulae and death may result. In treating these cases, a careful history is necessary; if a cervical neoplasm is found on digital and visual examinations, biopsy in all save submucous growths is essential to exact diagnosis. There is no conceivable danger of causing metastases by clipping a small fragment from an ulcerated and bleeding cervix for microscopical study. A blood Wassermann should be performed in each case, and general and x ray examinations are helpful in determining early metastases.

The question of massive or fractional doses then arises. Where cure is hoped for our experience favors massive dosage at the outset, with repetition in eight weeks if necessary; in advanced conditions greater palliation is often secured by fractional dosages.

With the patient in knee-breast position and the cervix well exposed by a Sim's speculum, radium emanation in one or two brass tubes in rubber cots is placed in the cervical canal, and four to seven radium tubes in a gauze applicator are spread over the vaginal portion of the cervix, so distributed that the surface of the growth and the cervical canal receive approximately the same exposure (Figs. 1 and 2). The amount given varies with the extent of the disease, but averages 3,000 mc. hrs. for the first treatment. The parametria are best treated by surface applications of heavily filtered x ray through suprapubic, sacral and perineal portals. We use a water cooled tube operating at 240,000 volts and 40 milliamperes, with filtration of 1 mm. copper and 1 mm. aluminum, and 50 cm. skin target distance. This technique I have previously described (5).

The paramentria may be treated by implantation of glass spicules containing ra-

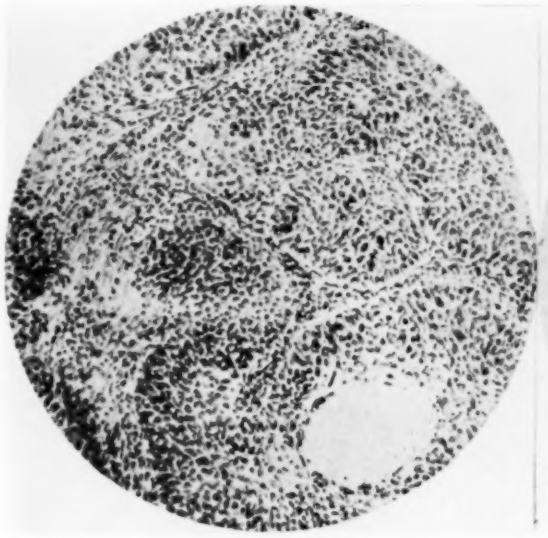

Fig. 3.—Carcinoma of the cervix before radiation. Note the arrangement of the cancer cells in alveoli. (Photomicrographs by N. M. Alter.) (6.)

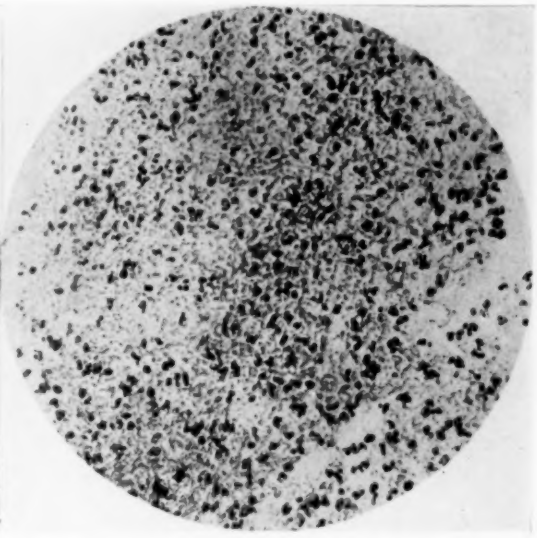

Fig. 4.—Same case as Fig. 3 after treatment with radium, showing destruction of parenchyma cells and influx of connective tissue.

dium emanation, inserted through the vagina, or by external massive radium packs applied to pubis and sacrum.

The main point in technique in topical application of radium to the cervix consists in efficient protection of the rectum. The vaginal walls and to a lesser degree the bladder are more radioresistant than the rectum. Lead filters of a quarter inch thickness wrapped in gauze are introduced into the vagina and interposed between the radium tubes and the posterior vaginal wall (Fig. 2). Without this precaution some rectal irritation will ensue, manifested by diarrhea and tenesmus, and ending in rectal ulceration, fistula formation, or death from infection.

PATHOLOGY

In considering the histological changes wrought in malignant cells by radium and x ray, we must remember that we are dealing with the unknown biological and chemical action of the rays on cancer cells whose etiology is likewise unsolved. Nevertheless the specific changes in the malignant cells occasioned by the rays can be well studied in cancer of the cervix, as repeated tissue examinations can be made at intervals during the course of the treatment.

For the first week after heavy radiation, the changes are simply those of inflammatory reaction: edema, hemorrhage and the appearance of numerous young blood vessels.

Then profound changes occur both in the parenchyma and in the stroma. In the parenchyma, there is swelling of both nuclei and protoplasm, and the nuclei become pycnotic; vacuolar degeneration occurs in the protoplasm. Mitotic figures are not

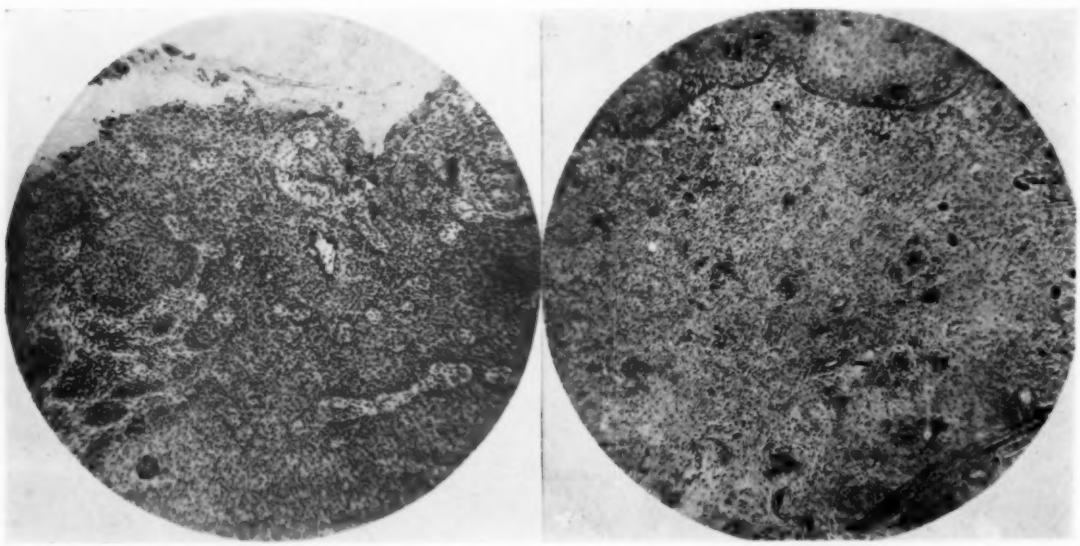

Fig. 5.—Squamous cell carcinoma of cervix before treatment.

Fig. 6.—Late effects of radiation therapy in carcinoma of the cervix. There is normal epithelium and mucus membrane at the lower pole, but laterally on either side of the center of this picture extensive hyaline changes are seen, with proliferation of sclerosing connective tissue which has followed destruction of the malignant parenchyma.

usually seen from the second week on. In the third week many cells suffer liquefaction and necrosis. There is invasion of eosinophilic leucocytes and lymphocytes. The eosinophilia and vacuolar degeneration suggest chemical destruction due to the rays. With the decrease or absence of mitotic figures in the malignant cells, there is a marked increase and proliferation of connective tissue, breaking up the alveolar arrangement of the cells into little nests. In the fourth and fifth weeks definite destruction of the nuclei and protoplasm of the malignant cells is seen. The chromatin substance is discharged from the nuclei and forms irregular globules in the protoplasm. Eight or nine weeks after radiation the cells containing the irregular globes of chromatin substance have agglutinated, the cell outlines are lost and the fusion produces large chromatin masses which are seen surrounded by phagocytic cells, mostly plasma cells, polymorphonuclear leucocytes and mononuclear endothelial cells (Fig. 7). Meantime the changes in the stroma are progressing—increase and extension of young connective tissue, probably formed mainly from wandering cells. Finally, the connective tissue becomes poorer in cells, produces a greater amount of fibrils, and the tissue becomes sclerotic. Alter (6 and 7) considers the destruction of the cells of the malignant parenchyma to be the primary effect of radiation, and the increase in the stroma—the most striking effect—to be secondary, due to the disappearance of the parenchyma. The most pronounced effect of the rays is the destruction of the chromatin substance of the parenchyma cells.

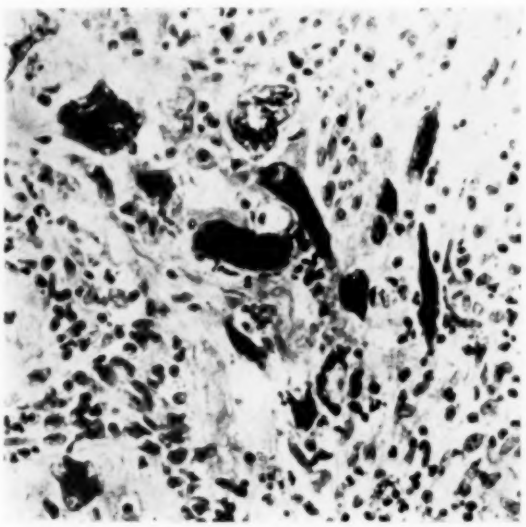

Fig. 7.—Late effects of radiation in cancer of the cervix. "Laking" of the large chromatin masses which were formed by fusion of globules of chromatin extruded from the broken-down cancer cells. These masses are now surrounded by phagocytic cells.

Different types of carcinoma show characteristically different behavior to effects of ray therapy. The more undifferentiated or embryonic the type is—as basal cell epithelioma—the greater effect is seen from the action of the rays. Marked cellular destruction, loss of arrangement and "melting" of the parenchyma occur. On the differentiated types, as adenocarcinoma of the cervix, the rays have a hastening effect on the differentiation, taking place at the expense of the multiplying capacity of the cells, gradually decreasing the growth. The end result in adenocarcinoma would be cyst formation or the formation of glands in the resting state.

STATISTICS

In this country the pioneers in radium therapy are Howard A. Kelly and Curtis F. Burnam (8), who presented in the spring

of 1915 the result of six years' experience in treating carcinoma of the cervix (1). It is an astonishing fact that these authors, speaking at an annual meeting of the American Medical Association, had to preface their report with a description of the physical properties of radium and arguments for its therapeutic use in cancer—and this only ten years ago. This excellent study was based on a series of 213 cases of cancer of the uterine cervix and vagina treated with radium at the Howard A. Kelly Hospital between Jan. 1, 1909, and Jan. 1, 1915 (See Table I). The cured cases in the operable group ranged in time from six months to over three years, and in the inoperable group varied from six months to over six years.

In 1916, a year later, Howard A. Kelly reported before the American Gynecological Society the results he and Burnam had achieved to this date (9). The series now included 327 cases with 69 clinical cures, one for seven years and six over six years (See Table II).

In May, 1922, Curtis F. Burnam made a further report of results to the American Radium Society (10). Of the original 14 operable cases reported in 1915, seven still survive—the oldest over eleven years. Of the 53 cures among the 199 inoperable cases 15 remain in the cured class (See Table III).

I have collected statistics of 54 recent cases treated at the Howard A. Kelly Hospital with radium applied topically and deep x ray over the parametria (See Tables IV, IVa and IVb). Although only 5 of the 54 were early operable cases on admission, we have 20 per cent clinical cures, the longest over four years. Only 22 per cent were not benefited. Comparison of the primary cases with the recurrent cases is interesting. The clinical cures in the recurrent cases drop to half, but there is an increase of 10 per cent in the number markedly improved.

CONCLUSIONS

At present writing the best technique in radiation therapy of cervical cancer seems to be a combination of radium applied topically and deep heavily filtered x ray over the parametria, rather than the use of either agent alone. If massive amounts of radium are available heavy external treatment with radium can be substituted for the x ray.

Opinion is still divided as to the relative merits of radical surgery or radiation therapy in the early operable cases. In many clinics the latter appears to offer as much as skillful surgery in this class. Prophylactic radiation should always be used after operation.

In borderline or advanced conditions radium and x ray are far superior to surgical methods.

In recurrent cancer, where surgery is certainly of no avail, radiation treatment offers excellent palliation.

TABLE I.
Carcinoma of Cervix Uteri.
January 1, 1909—January 1, 1915.
Howard A. Kelly Hospital.

				Percentage
OPERABLE CASES		Clinical Cures		
Op. and Ra.	10	10.	(3 yrs. plus)	100%
Radium	4	4.	(3 yrs. plus)	100%
	14			
INOPERABLE CASES				
Not Helped:		37.		
Improved:		109.		
Clinical Cures:		53.	(6 yrs. plus)	26.6%
	199			

TABLE II.

Carcinoma of Cervix Uteri.
January, 1909—April, 1916.
Howard A. Kelly Hospital.

Total Cases:	327.	
Clinical Cures:	69.	(7 yrs. plus)
Percentage:	21.1%	

TABLE III.

Carcinoma of Cervix Uteri.
January, 1909—May, 1922.
Howard A. Kelly Hospital.

OPERABLE CASES		
No.	Clinical Cures	Percentage
14	7 (11 yrs. plus)	50 %
INOPERABLE CASES		
199	15	7.5%

TABLE IV.

Carcinoma of Cervix Uteri.
Recent Cases—Howard A. Kelly Hospital.
Radium and X Ray.

Primary Cases:	44	
Recurrent Cases:	10	
Operation and x ray	1	
Total:	55	
	No.	Percentage
Not Helped:	12	22%
Slight Palliation:	14	25%
Marked Improvement:	17	31%
Not Followed:	1	2%
Clinical Cures:	11 (4 yrs. plus)	20%

TABLE IVa.

Carcinoma of Cervix Uteri.
Recent Cases—Radium and X Ray.

Primary Cases:	44	
Not Helped:	10	23%
Slight Palliation:	11	25%
Marked Improvement:	13	30%
Not Followed:	1	2%
Clinical Cures:	9	20%
Recurrent Cases:	10	
Not Helped:	2	20%
Slight Palliation:	3	30%
Marked Improvement:	4	40%
Not Followed:	0	00
Clinical Cures:	1	10%
Operation and X Ray:	1	
Clinical Cures:	1	100%

TABLE IVb.

Carcinoma of Cervix Uteri.
Recent Cases—Radium and X Ray.

Primary Cases—*Stage*	
Early	5
Borderline	4
Advanced, Inoperable	35
Primary Cases—*Tissue*	
Squamous Cell Carcinoma	18
Tissue Not Recorded	17
Adenocarcinoma	5
Basal Cell Carcinoma	4

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THE TREATMENT OF ANTERIOR POLIOMYELITIS*

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IN recent years there has been no change made in the treatment of anterior poliomyelitis during the acute or febrile stage. Complete rest with proper supporting of muscular and other soft tissues still constitutes the classic mode of treatment. At least this seems to be so with respect to American orthopedic surgeons. And yet we still find altogether too many contractures, curvatures and other deformities, developed during the second and chronic stages, which, to a large extent, could have been avoided. Eight or ten years ago when a badly deformed polio spine was brought to us we accepted the condition as a natural, though unfortunate sequel of infantile paralysis, but when such cases come to us now we sometimes wonder how and why these enormous deformities were allowed to develop. Upon questioning we frequently learn that the case was treated during the second stage by ill advised electrical or exercise treatments or the wearing of mail order or equally improperly fitted braces. Comparing these unfortunates with a goodly number of polios who have been under our care and supervision for from one to ten years, we cannot help but feel that the doctrine of rest, the avoidance of nerve and muscle cell irritation and proper splinting during the earlier stages is still an unknown quantity in the minds and practices of many practitioners. To be sure, not all deformities can be avoided. We must remember that the disease is a general though mild toxic process involving almost the entire body, but especially characterized by anterior cord lesions resulting in weakened and paralyzed muscles, producing a mechanical as well as a physiological derangement of the neuro-muscular apparatus.

The factors which are intimately concerned with the causation of deformities are well known but somehow not always closely observed. I refer to muscle stretching, muscle fatigue, muscle atrophy and muscle balance. No other phase of infantile paralysis is so impressed upon our medical students as these four factors. Proper treatment consists in prevention as well as remedial measures. This is strikingly true of poliomyelitis. No doubt many of you have seen in your practice cases illustrative of this thought. Mistakes are not always confined to the general practitioner, but to specialists as well. Recently there was referred to us by a neurologist, a patient who had fallen on his shoulders. The trauma resulted in a paralysis of the deltoid. His arm for the following three weeks was only partially supported by an ill fitting sling worn a part of the time. The result was a continuous stretching of the muscles involved. He was given an abduction splint with appropriate physical therapeutic meas-

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ures and made a complete recovery. A weakened muscle put on a stretch will deteriorate and frustrate all efforts of treatment to strengthen it. Such a muscle must first of all be placed in a position of complete relaxation.

A weakened muscle must not be overworked electrically, by massage, or exercise. All exercise treatment should stop short of the point of fatigue. This, of course, necessitates at least a working knowledge of the degree of paralysis as a prerequisite to the function of prescribing exercises. This might well lead us on a long discussion of the desirability of actual necessity of knowing, to its finest detail, the actual degree of paralysis. There are some, for instance, who include in their examination the reaction of degeneration, a condition, as you know, in which a muscle no longer responds to the faradic and only sluggishly to the galvanic current; or perhaps he may resort to the bi-polar method when stimulation of muscle by way of its normal motor point elicits no response. New and still more accurate appliances for nerve and muscle testing are now on the market, one of the best of which is the Lewis Jones condenser. There seems to be no doubt of the efficacy of those procedures and they are, in the minds of many, essential in the diagnosis, prognosis and treatment of peripheral nerve lesions; but we do question the necessity of the application of these detailed methods in poliomyelitis. Its general use is prohibited because of the expertness necessary to make an accurate test, a situation certainly not present in the experience of the general practitioner. Neither is the extensive apparatus necessary for making the tests always at his disposal.

There is a far simpler method of ascertaining the degree of existing paralysis which, for all practical purposes, is sufficiently accurate. It was proposed several years ago by Lovett and his co-workers and has been used by our physical therapeutic department with considerable satisfaction. It is not without faults, for the personal equation plays a factor, but with an understanding of its principles and a little practice one may use it as a very practical working tool. The scheme as we use it consists in arbitrarily dividing the working power of a muscle or group of muscles into six parts. A normal muscle is equal, in working power, to its uninjured mate on the opposite side of the body which is used as a control. This condition is noted on the record sheet as No. 1, a good muscle. No. 2 is a muscle capable of performing its work against gravity and with resistance, but a little less than the normal, classified as a fair muscle. No. 3 is one which can work against gravity but not with added resistance. We designate as No. 4 a muscle which can act through its normal range of movement but with gravity eliminated. No. 5 is a muscle which shows a trace of muscular contraction but no movement; while No. 6 shows no trace and, therefore, is recorded as complete paralysis, remembering, however, that an electrical stimulation might show it to be but partial, yet for our purpose the designation of complete paralysis carries its definite message. This may seem to be a complicated scheme, but actual prac-

tice proves it to be otherwise. It has the advantage of placing in the minds of the operator and the patient a fairly accurate picture of just what the various muscles or muscle groups may do if directed by the will of the patient, a procedure far more convincing to the patient than contractions obtained by means of electrical currents. This is important when we recall that the one prime and cardinal desideratum in our treatment of paralysis is the ultimate attainment of purposeful, voluntary, active muscular response to an impulse directed by the brain. When this is accomplished we may rate a muscle in class No. 1, and in need of no further treatment.

Having thus ascertained the degree of motor disability it seems fitting to discuss the problem of proper prescription of exercise which is fundamental to the success of the treatment. Let us recall the cardinal points relating to function and structure of weakened muscular tissue, fatigue, stretching and muscular balance. With the aid of the knowledge obtained in our previous examinations this matter becomes relatively simple. We choose an exercise less severe than the weakened muscle or group of muscles can actually perform, as noted on our record sheet. For example, if the deltoid movement is classified as fair, No. 3, meaning that it is just able to raise the arm shoulder high, but not with added resistance, then the patient should not be given exercise which calls for the raising of the arm in the standing position. He should be given arm raising movements while lying on a table, the arm being raised shoulder high on a horizontal plane, either gliding on a smooth surface or suspended on a sling. This procedure eliminates gravity. As the strength of the muscle returns the intensity of exercise is increased by resistance or by progressively raising the head end of the operator's table, thus approaching nearer and nearer the sitting position. The return of power continues, then the patient may be given the exercise in the standing position.

At first it may be necessary to perform the movements passively, but every means should be used to stimulate and encourage the child to help the movements by concentrating its attention on it. Each movement should be carried out to its physiological limit. As soon as the patient is able to perform the movement actively or partly so, passive movements should cease, but the active movements must be assisted by the nurse, so as to avoid overtiring the muscle until the patient can perform the exercise without any assistance. As soon as this can be done with ease then resistance may be offered on the part of the nurse.

Besides their physiological effect, exercises following definite commands are of a decided educational value which has a direct bearing on the complete restoration of the neuromuscular complex. They awaken numerous sensory and motor perceptions, clear cut and well defined regarding distance, direction, weight, force, resistance and effort which might otherwise remain dim and vague.

As soon as conditions permit, games and plays should be instituted for the purpose of stimulating initiative, remembering our aim is to attain purposeful, voluntary, active

movements. New paths along which motor impulses may travel from brain to muscle may have to be built to take the place of old ones destroyed. This can be done only by means of the active cooperation of the will of the patient and no amount of electrical stimulation will accomplish this. In a gymnasium class, drills, marching and dancing are excellent. The balance board and wall ladders are very useful apparatus if available. It is a good plan to have both limbs, the sound and the paralyed, work together, e. g., with wands, hoops, basketball, etc., or let the sound limb perform first followed by the other. An unlimited fund of patience must be at the command of the operator who conducts the work, for very frequently weeks and weeks go by without any sign of improved function. The patient, too, gets restless and impatient and his efforts may become feeble but, unless the nerve is entirely destroyed, oft times repeated voluntary exercise, even if weak, may rebuild and repair the damaged motor tract and restore motion.

As it is necessary in the earlier stages of the developmental process to stimulate cooperation of the patient so, conversely, in the later stages it frequently becomes necessary to hold in check the child's enthusiasm. This is particularly true in leg paralysis when the child is so eager to start walking. Leg muscles have weight bearing function as well as that of motion, which fact adds to the strain and necessitates especial care.

For the maintenance of nutrition of nerve and muscle tissue during the convalescent period medicine can do next to nothing, while surgery confines itself to preventing deformities by means of splints and braces, thus throwing the burden of the treatment in the field of physical therapeutics.

Until quite recently electricity has probably done more harm than good, excepting in those cases who fortunately came under the care of the relatively few doctors who knew how to intelligently handle the various currents. The last few years, however, has brought a great change. More and more the profession has come to realize the potency of the electric current as applied to treatment of paralysis. It would lengthen this paper beyond its allotted bounds were we to analyze in detail the potencies and qualities of the various currents. Suffice it to say at this time that we use the sine waves in their various modifications wherever possible for the particular purpose of increasing the health of both muscle and nerve tissue.

Heat, especially radiant heat, is particularly indicated in the treatment of polio. It has a most beneficial effect upon the circulation, bringing new fresh blood to the parts, hastening the lymph and venous flow. It enhances the effect of massage and electricity, makes for a better muscular contraction, and imparts a general feeling of well-being to the patient. Hot water or convective heat, emitted from a nonirradiating body, is less efficient than radiant heat, which penetrates deeper and which has a vitalizing reaction on the muscle cell. Of late we have been employing diathermy in

the form of autocondensation as well as locally with a great deal of satisfaction.

Massage has been employed in the treatment of paralysis as far back as we have knowledge of the disease itself. It acts most favorably on the nutrition of the muscular tissue by favorably influencing the circulation, returning waste products and imparting mechanical stimuli to the muscle. It tends to combat atrophy. Too long or too vigorous manipulation, however, may cause muscle fatigue, injure muscle fibers and diminish tone.

Recently Bordier of France has reported treating polio by means of the x ray. He states, "That the rays act upon the diseased cells, progressively bringing about their more or less complete restoration, depending upon the dose absorbed, the earliness with which treatment is begun after the beginning of affection, and the virulence of the pathogenic agent." We have had no experience with this modality, but have noted that little progress has been reported along this line of treatment, and mention of this modality is made here merely as a matter of information.

All of these agents massage, heat and electricity, in their various forms, are useful in exerting a powerful nutritional value to the damaged nerve and muscle tissue, and that is all. They do not tend in any way to reestablish the damaged neuromuscular apparatus. That can only be accomplished by voluntary exercise. Muscle training aims to reestablish the disorganized motor nerve tracts by building new paths around the damaged area so that the impulses may again reach the desired muscles.

SUMMARY

We may then briefly summarize our conclusions by stating that: First, heat, massage and electricity are valuable in the treatment of poliomyelitis in the convalescent period for their general nutritional effect upon the muscle and nerve tissue.

Second, that muscle fatigue and muscle stretching must be carefully avoided, as they tend to further damage the already weakened muscle.

Third, muscular balance between the opposing groups must be maintained to prevent deformities and further damage to muscle.

Fourth, that wherever irreparable damage has been done to a limited area in the cord, thus damaging a given number of synapses, we can only hope to establish new motor tracts by repeatedly sending different motor impulses from brain to cord, eventually building new motor paths around the damaged area.

Fifth, that this can only be accomplished by voluntary purposeful exercises.

DIATHERMY IN ANGINA PECTORIS*

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THE subject of my paper is not exactly that printed on the program, due to my inability or failure to get in touch with the program committee, and in no way due to an error on their part. However, since many clinicians classify any degree of precordial pain or distress as angina pectoris, while they subdivide it into various heads, calling that pain associated with coronary thrombosis angina, and that other pain produced on exertion, disappearing on rest, aortic fatigue, it is immaterial to us for our consideration at this time. This is true for myself, and I think for most of us, for the exact mechanism in the production of precordial pain or distress is not clearly understood. Therefore, I have chosen the older and more common term, "Angina pectoris."

I have been especially interested in angina pectoris because my father-in-law died during an attack, and I had followed the course of the condition in his case from the onset. He was about 64 years old when he had his first attack in the night, which a colleague of his diagnosed as peptic ulcer. Later the correct diagnosis was evident because of the tremendous cardiac disability ensuing, with auricular fibrillation and profound exhaustion. No doubt this was a case of coronary thrombosis, from which the great majority die; but he finally recovered and became more or less active, but was always subject to anginal spasms, induced by muscular effort. His blood pressure, both before and after, was never over 120, and I have come to view angina, in cases of low blood pressure, as the most serious variety. His other attacks, between the first and last, were due to something else, certainly not thrombosis. In his case it was easy for me to view them as spasms of the coronary arteries, with subsequent spinal irritation, referred pain and sense of chest restriction. I have since seen two cases of what was probably coronary thrombosis, because following the attack was a frictional rub and some slight temperature. One of these cases died in two weeks, while the other recovered. The case that died was in a woman of only 53 years, who was taken with a terrible pain in her back between her shoulders. It was two days later that the real condition was suspected. This patient never had a high blood pressure; I had repeatedly taken it and it was always around diastolic 80, systolic 130. By far the greater number of patients suffering from pain in the chest and arm or a sense of constriction in the chest induced by exertion have a blood pressure above normal and the pain diminishes rather quickly on rest. Some are calling this condition, which is not followed by prostration, "aortic fatigue." Whether or not it *is* aortic fatigue is not of particular moment, unless it helps

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us in our treatment. The fact remains that these people often die in an attack of pain, though many survive for many years; all are more or less incapacitated. The pain frightens them, gives them often a sense of impending danger, and so in itself unfits them for sustained work.

The only really effective treatment I have had to offer these people was prolonged rest. Of course, I employ nitroglycerine and amyl nitrite for immediate relief and often prescribe erythrol tetranitrate as a vasodilator, with a little more permanent effect than the other two drugs mentioned. The fact that relief does often follow the use of the vasodilators indicates either a spasm of vessels or fatigue due to pressure. True, I do feel digitalis should always be given to such patients in small doses, say one grain a day, and that it is a real benefit, but I have never seen the pain cease altogether from such treatment unless exertion was avoided.

When I first added physiotherapy to my treatment and became acquainted with diathermy and its effects, I wondered if it would not be of use in these cases. Whether it be aortic fatigue or coronary spasm, the ordinary attack of angina seems to me to be due to lack of nutrition somewhere. The heart is called upon to do more work than it can deliver and a spasm results. The heart muscle is inadequately nourished because of impaired circulation through the muscle or the aortic wall is not capable of maintaining its elasticity because of impaired nutrition. Diathermy increases nutrition by stimulating an increased circulation; the heat produced in tissues, nature removes and her only method is by increased circulation. Sweat glands only help when the general heat is to be dissipated or the heat is produced near the surface. Because of this reasoning, I ventured to try diathermy in angina pectoris. I admit I was a bit reluctant to do so at first, for if circulation was inadequate, how could I produce artificially a demand for more? On the other hand, the only way to restore function is by use and I felt that with the patient at rest and the diathermy very mild at first, no untoward symptoms would result. Moreover, if the coronary vessels were sclerosed, I might have a tendency to check the process, if I did not improve the condition. I am certain that no harmful results have followed the treatments. The series chosen is naturally not as large as it should be, but is of sufficient number to be strongly suggestive and, I believe, to warrant trial in most cases.

CASE HISTORIES

CASE 1. One of the first cases upon whom this was tried was that of a man, C. O., aged 55, who in 1919 had a severe pyelonephritis, caused by an ascending infection as a result of an enlarged middle lobe of the prostate. In 1920 he had a two stage operation done by Dr. D. J. Barney. His kidney by the phenosulphophthalein test was almost zero, but the drainage was continued for several weeks with daily subpectoral salt solution injections for some time. When the function reached 30 per cent the prostate was enucleated and he recovered uneventfully. However, as soon as he got up

and around after the operation he developed a definite angina pectoris, as the term is generally used. His blood pressure was around 165/80, he could not go up a flight of stairs without distress and he was often dyspnoeic. He certainly was unable to work and he and his wife maintained themselves on the small income she could earn; at various times he obtained two or three light jobs which he had to give up, although finally he did obtain a place where he did what light work he could and received pay in proportion.

In December, 1923, we began to use diathermy through the heart; his improvement was marked.

I have a note, March 5, 1924: "B. P. 164/68, pulse 90, feels fair; has a very little distress in the epigastrium; has been working hard and has very little dyspnoea." On April 19, 1924, I read: "Has no pain or distress in epigastrium; following diathermy through heart, claims he has a peculiar dizzy feeling on top of head; has no dizziness, except at times of treatment; no dyspnoea on climbing stairs."

This man continued to work in a shoe shop up to March, 1925, when he had an exacerbation of the old pyelonephritis. This recurrence was our diagnosis, because his urine contained a good deal of pus, was of low specific gravity, had a small amount of albumen and a large number of short strained streptococci. He died as a result of this and I had no reason to feel that his heart was an important factor in his death. This man before using diathermy could not walk fast or exert himself in any way without severe pain, but in a few weeks after treatment was started he was able to begin uninterrupted work and never again had severe symptoms of an anginal character.

CASE II. The next case is in a man in whom I have had a very great interest from the start; he has not only been a valued patient, but a friend. I was first called to see him in 1917, because of his violent headaches. His blood pressure was high, something like 240/130. I restricted his diet at once and favored elimination as well as I could. He was given potassium iodide and small doses of digitalis. I investigated him from every angle and took him to an excellent internist. We felt there was something his kidneys would not excrete, but could find nothing wrong with them according to tests; everything we did was negative, but his blood pressure remained high, with always a relatively high diastolic. On various occasions I withdrew a pint of blood at a time and frequently I would put him to bed for a week or two; in this way he was able to attend to his work, but he developed some dyspnoea on exertion and some constriction in the chest.

Finally November 13, 1923, he had a severe attack of angina in which he was carried home from his office in a rather alarming condition. He was kept in bed for a week and diathermy has been used directly through the heart and aortic arch since. At first this was given three times a week for nearly three months, then twice a week for another season and now once a week. All the pain and sense of constriction in his chest has been dispelled and he is of the

firm belief that this is due to diathermy. He is apparently and by his own testimony in much better condition than at any time since I have been attending him. He has been able, in his own affairs, to meet a very trying strain placed upon him by industrial conditions and to be therein unusually efficient. He could not have done several years ago anywhere near the amount of work he has done this last spring and summer. I am now adding eliminative diathermy, which in my belief is offering him a little benefit. His blood pressure has not been materially reduced, although we manage to keep the systolic down to about 200 and the diastolic between 110 and 120. Even in cases where the eliminative diathermy does not reduce the pressure materially, it improves their feelings and keeps them at work. I remember asking a man in the Boston City Hospital Clinic, whose blood pressure was 240 and remained there, why he kept coming for autocondensation, and his reply was that if he didn't he wouldn't be able to do anything. The superiority of the eliminative diathermy of which I speak, over autocondensation is firmly established in my mind.

CASE III is that of Mrs. R., aged 44, who first consulted me October 10, 1920, complaining of being tired and having pressure in her chest on exertion. Her blood pressure was 210/130, and fluctuated under diet and general treatment to some extent keeping always in the neighborhood of 200 systolic and 100 to 120 diastolic. During the next two years I occasionally kept her in bed for a week or two at a time, when the pain was particularly troublesome or she was especially dizzy. Throughout this time she had continuously small doses of digitalis and considerable potassium iodide. Various tests were done to determine a cause for the disturbance; her kidney function seemed normal, the phenolsulphophthalein test being 85 per cent for the first two hours. Her teeth and tonsils were investigated, finding trouble in each case, whereupon such teeth were extracted and the tonsils treated by suction and local applications.

On two or more occasions I withdrew a pint of blood for relief.

Feb. 7, 1923, there is noted her complaint of dizziness and short periods of hemianopsia; blood pressure 200/94.

In June, 1925, I started her on autocondensation and also the Morse wave generator, in order to increase elimination through the bowels.

Sept. 6, 1923, there is a note that she was having hay fever and her blood pressure was 200/114.

In October, 1923, she had arthritis in her finger joints, which cleared up under direct diathermy and elimination. The dizziness was more or less persistent and the pain in her chest appeared on exertion.

Late in 1923, I started her on direct diathermy through the heart and head, which treatment she has continued ever since, though for some time she had been coming only once a week.

January 11, 1924, her record shows a note that she is having no real pain in chest, but does have an uncomfortable feeling on

exertion; her head is not dizzy, but does not feel right; blood pressure 180/108.

May 7, 1924, she was complaining of a dizzy head, but had no pain in chest; blood pressure 192/114. At this time she was having direct diathermy through the heart once a week.

April 20, 1925, she reported having very few dizzy spells and chest pain only seldom. Direct diathermy through heart and eliminative diathermy has been given her since once a week. All through the summer and fall she has felt better than she had for years and is doing her work without difficulty. I have not been called to see her at home for over six months; recently her blood pressure taken by one of our operators was around 180.

CASE IV. The next case is perhaps the most striking of any that I have to present. It is that of the father of Mrs. R., who is at present 68 years of age. While calling at the house to see her I frequently talked with him, but was not asked to do anything to relieve him until his condition became serious. I was called in to see him early in 1924. He then could not walk across the floor or even put on his coat without severe precordial pain; he was given nitroglycerine for relief (which he has carried with him ever since) and a grain and a half of digitalis per day. For some time he could not be persuaded to take diathermy, but after repeated urging by his daughter and myself, he consented, was brought to the office in an auto and had diathermy through the heart twice a week. He is now coming once a week, but both he and his daughter say he would no more think of giving it up than of going without eating. He immediately began to improve under treatment and although when he first came pain was produced by the passing of the automobile over a rough place or by getting into the machine, he now does more or less light work about the house and yard without such manifestation. His blood pressure has never been high, ranging around 150 to 160 systolic. I have never seen in any condition any more striking instance of relief afforded than in this case.

CASE V. Mr. T., aged 50, who consulted me June 30, 1924, complaining of smothering sensations and dizziness. He had been to a number of physicians, but was steadily becoming worse. Examination at that time revealed a pulse rate of 120, an enlarged heart with a systolic blow at apex and dyspnoea on exertion. His blood pressure was 248/156, and his urine with a specific gravity of 1020, contained a moderate amount of albumen. His Wasserman was negative. Because of the constriction in his chest and smothering sensation, he was immediately started on direct diathermy through the heart and autocondensation. He was placed on a strict diet, eliminating meat and salt. He was given digitalis, grains three each day, as well as potassium iodide. On various occasions I practiced venesection, removing a pint of blood at a time. There are notations on his case at weekly intervals, his blood pressure averaging 260/140. One very noticeable feature was that every other beat was stronger than those intervening, there being a difference of about 20 mm. mercury in the pressure (pulsus alternans).

This case never improved, but grew worse, was put and kept in bed, and died May 1, 1925. His case was one in which the strain on the heart was greater than it could bear and no treatment was of any avail. I present it not to prove or disprove the value of diathermy, but to show that, like any other therapeutic agent, it cannot accomplish the impossible. This was a case of hypertensive heart disease. What angina he had was truly insignificant compared to other signs of cardiac embarrassment, viz., breathlessness, passive congestion of the lungs and restlessness. Of all physical therapeutic agents, the only one that could have offered any degree of relief was eliminative diathermy, and its value is a very doubtful matter. I am personally inclined to be rather pessimistic in looking for results when a definite alternation of the heart beat is found. It is my belief that we should be just as cognizant of the limitations of a modality as of its accomplishments.

CASE VI. The next case is also one on which the failure was marked. It is that of a fireman, Mr. G., aged 40, who had angina pectoris in a severe form, with a blood pressure never over 120 systolic. My own experience has been that angina is harder to relieve in such cases than when the pressure is higher. This man came to the office three times a week for direct diathermy and improved. The pain in his chest and left arm had almost disappeared in a few weeks, when he began to increase his activity. I cautioned him about exertion, but not sufficiently. He finally asked me about driving his auto, which I discouraged; however, I did say that the mere steering his machine would probably do him no more harm than what he was already doing. He consequently took his machine out and when some misbehavior of the brakes stalled it in the middle of the road so that he could not start it, he got out and tried to push it to one side of the road. He was seized with a terrible attack of angina which admitted no relief and died six hours later. This man should never have died; because diathermy had helped him; but its efficacy should not have been overestimated by him, as it surely was. Could he have been kept quiescent for a year or two, diathermy continued and most carefully graded exercises begun, the outcome would have probably been very different and the cause of physiotherapy would have been strengthened rather than hindered.

CASE VII. The seventh case is that of Mrs. A., aged 57, who had had pain through chest and back for over a year. This was usually induced by exertion. She came to me in March of this year after a severe attack early in February, with subsequent dyspnoea. Her heart sounds were good, but there were extra systoles and her blood pressure showed distinct alternation, being 150-170 systolic and 90 diastolic. She was given digitalis and a choral bromide mixture and advised to rest; the next day she was better and the alternation had disappeared. I consequently felt it safe to prescribe diathermy. This she has had and experienced great relief. I have not seen her for some time, as she considers herself well and in such an attitude on her part there is no danger. No patient with severe myocardial disturbance can "get well" in a few months,

if at all. There is no question in my mind but that diathermy has helped her, but not to the extent that cessation of treatment, including rest and digitalis, as well as diathermy, is justified.

CASE VIII. The last case I shall discuss is that of Mr. L., aged 66, an ex-shoe worker, who came to the office March 23, 1925, complaining of a pressure sensation on exertion over the heart and extending down the left arm. This came frequently in the night or on waking in the morning. He had been to several physicians without getting relief. Examination was essentially negative; blood pressure 147/74, Wasserman negative. He was given 1½ grains digitalis per day, a mild hypnotic and direct diathermy through the heart. Nitroglycerine was also given to carry with him to relieve the angina, which did not allow him to walk 100 feet without stopping. He has been having diathermy through his heart twice a week up to date and reports to me once a week; he has always kept a low blood pressure, well under 120 systolic. The following are picked notations:

May 5: Chest is just the same; had to stop six times in walking a short distance.

May 15: Still has angina, although a little less severe; also complains of headaches, which we have tried to relieve in various ways, but seem to be independent of the angina.

June 25: Blood pressure 112/62, pulse 60; would feel all right were it not for the pain in back of neck and head.

August 3: Head feels better, but chest was bad yesterday. Blood pressure 108/66; can't eat on account of pain in chest; had to take nitroglycerine pills yesterday and one this morning.

August 24: For two days has felt fine, but awoke last night with pain in chest and arm; took two nitroglycerine pills and had bad headache, which is now gone.

September 4: Feeling fine; head still aches in mornings. Pain in arm and chest improving.

September 14: Feeling fine; head is better. Improvement in pain of chest is marked, but strenuous exertion causes it to recur.

This last note expresses the condition up to date. He can now walk a fairly good distance without experiencing discomfort in his chest. He is in the best shape he has been for two years, he declares. This case has not received much improvement until recently, although his own sensations have registered enough relief to keep him coming without urging. It is one of low blood pressure with fairly marked angina. My own conviction is that diathermy has been of benefit, though in no striking manner.

TECHNIQUE

In using diathermy in these cases we have a plate cover the heart and aortic arch area over the chest and one opposite over the back about twice as large. Treatments are mild at first, using no more than 25 milliamperes per square inch of the smaller plate, and continuing about twenty minutes after reaching this maximum. Gradually

both time and strength are increased until about 75 milliamperes per square inch is used for forty minutes.

The cases receiving the most benefit are those with some elevation of blood pressure and no other serious signs of a failing myocardium, except pain and discomfort, on exertion. Persistent alternation of the heart we regard as unfavorable, and would expect no benefit in such cases. Cases of low blood pressure are relatively resistant; improvement is obtained, although it is slow, and the patient needs caution as to placing confidence in the treatment to the exclusion of needful rest. If both patient and family in these cases are aware of the resistant nature and seriousness of the condition, and in case of sudden death will not blame the treatment for the fatality, I should advise diathermy and persist in its use.

A few cases like these, I realize, are not enough to establish the value of this form of treatment in your minds, but they may be suggestive and I can only hope that other experiences will prove the correctness of my impressions and conclusions, which are a result of treating many cases not here reported.

DISCUSSION

Dr. Fred B. Moor (Loma Linda, Cal.): I have not had much experience with diathermy in the heart. My experience probably includes only three cases of this kind in which we have given some relief, I believe. I do admire the doctor's paper because he is not afraid to mention his failures as well as his successes. I think as a general thing we are prone to emphasize our successes and not mention our failures.

Dr. O. W. Wyatt (Manning, Iowa): I would like to compliment the doctor on his paper. He has surely gone through it thoroughly. If you will look up the records, you will find that the reports on the heart with physiotherapy, that is with diathermy, are characteristic by their absence.

There are a few things I think we should take into consideration in these cases. Most of them are due to infections, and if you will clean up your infections and give your diathermy a chance, your patient will be much improved.

I know in going over this the doctor was limited by time. It would take lots of time to cover all the points, but I think the emphasis should be laid on the infections and clearing them up.

In connection with this question of a kidney that is also damaged, I have found quite a good deal of assistance to diathermy in the heart by following it up with diathermy of the kidney. You can stimulate elimination in many ways.

Dr. Frank H. Walke (Shreveport, La.): I would like to ask a question as to the methods that the doctor employs in the treatment of these cases, whether he uses direct diathermy through the heart, or whether by the so-called autocondensation method. I think the doctor is to be congratulated upon his patients, for the simple reason that something must be done for these cases of angina, pseudo-angina, and heart fatigue. We say that digitalis fails us, our focal infections have been cleaned up as far as we know, and yet the patient has some discomfort and distress. What are we going to do? If we didn't have the sheet anchor of diathermy and autocondensation nothing could be done. I know life can be prolonged or the comfort of the patient can be secured by the use of diathermy or autocondensation.

I am very much interested in this for the reason that we have many heart cases in our community, and it has been my lot to treat quite a few of them. I would like to get the most efficient method possible for these cases. Of

course, I suppose it is in an experimental stage, and what current or modality is good for one would not be good for the other, the same as physiotherapy is a matter of common sense first in diagnosis and then treating the patient as well as the disease itself.

I would like to have Dr. Joslyn give his technique or management.

There is one other thing I would like to mention. We find cases in which the systolic drops but the diastolic does not after treatment. What explanation can be offered for such a condition?

Dr. G. A. Larsen (Hayward, Wis.): I was struck with the fact that the doctor's experience so actively coincided with my own in treating angina pectoris. In a given experience it would be almost a duplicate of Dr. Joslyn's.

I wish to state also that this treatment is just as effective in chronic myocarditis as it is in angina pectoris.

Regarding the doctor's question as to the method of treatment, I want to give my experience. I have seen very little or no benefit from autocondensation in those cases. I use the technique that Dr. Joslyn described, the smaller electrode over the precordial region, a larger electrode over the back.

I think I have seen some damage from using too large doses in the beginning. You want to start these cases with a milliamperage not to exceed four or five hundred milliamperes. It depends considerably on the type of machine you are using. Start in light. I have seen cases that I have given as high as 1,200 milliamperes, but the average will not take over five to six or eight hundred.

Previous to using diathermy, I have never found any treatment that I could say amounted to anything. It was palliative at the best. I have had some myocarditis cases and also angina pectoris that apparently have cleared up entirely. I had one case of a year and a half standing, a woman fifty-one years old, who would wake up in the night with severe pain. I can't remember the exact blood pressure now, but it was somewhere around 150 systolic, and about 90 diastolic. I treated this case approximately two months, and the blood pressure dropped from 150 to 130 systolic and from 90 to 80 diastolic and remained there. Her symptoms disappeared entirely and have not returned since, although this was about sixteen months ago that I gave her her last treatment. I have had some cases, however, in which I could not obtain any benefit whatever.

I think the vast majority of them with rest and diathermy can be benefited and some of them I am satisfied can be cleared up entirely.

Dr. Emery W. Carr (Lyons, N. Y.): I have certainly enjoyed every minute of this paper. I feel Dr. Joslyn has put me in the position where I am willing to do something. I have been fearful of treating these cases because I was afraid of the dire results that might follow. I think I have gained confidence.

There is one thing I would like to know. Special stress has been laid on the point that we must not carry our current above certain points. I would like to know what the unfavorable results are or the contra-indicating results are if we do.

Dr. Arthur E. Joslyn: Dr. Wyatt mentioned the fact that benefit is obtained by adding direct diathermy to the kidney, because so many of these cases were due to some form of nephritis, possibly. I don't know that he is right. When I have thought the kidney was involved I have tried it. I can't say that I noticed any great improvement. Whether it was due to poor technique or lack of observation I don't know. It is rational; it ought to help.

The first point in these cases is diagnosis, more or less of a differential diagnosis. Divide up and classify the angina that you have.

In these cases of angina without other demonstrable heart lesions I have seen cases where

the physicians could find absolutely nothing whatever on physical examinations. You may have a little enlargement and that is about all, with a slightly increased blood pressure, 180 or thereabouts. Those are the cases in which to go ahead fearlessly. In the case where there was profound pathology, unless the cause of the blood pressure was attacked and the blood pressure lowered, no method was going to benefit. If you can't find the cause of the high blood pressure, essential hypertension, or whatever you want to call it, and can not attack it, you can not get very far with any method of treatment.

I was asked about the technique. I place a plate over the region of the heart and aortic arch, being sure that I cover it in front, and being sure that the plate is in apposition with the skin, that there is absolutely no sparking. A similar plate about twice the size is placed behind, in direct apposition, the center of each plate being opposite. Then I proceed very carefully, having the operator watch the patient for any change in pulse rate, and keeping it down. Do not allow the patient to become apprehensive. The first treatment perhaps will be negligible; that is, you will only get the patient used to it, because apprehension produces angina, and that must be eliminated.

Then I add this so-called eliminative diathermy, that is from wrist to wrist or hand to hand, any way you wish it, passing it right through. It seems to me that helps as an addition in all those cases. That is essentially the technique for the cases of angina.

I was also asked if I had ever noticed that the systolic dropped and the diastolic did not drop. Yes, and I do not like it. It is bad. I had one case that I remember in which I just prescribed autocondensation, and I had it taken every night. His blood pressure was running very high, around 220. His systolic blood pressure went right down. He had his own machine in his house and he took it every single night. His diastolic went up. I do not know the answer. He then discontinued it every night, and we made it very much milder and got a little rise in diastolic and a little fall in systolic. Something was going on. There was a failing myocardium there. That is why his systolic went down and his diastolic went up. Whether the autocondensation was any factor in this I do not know, but I certainly viewed it with a good deal of alarm. I am going to change the treatment somewhat by putting the patient to bed and giving him digitalis to get a fairly decent pulse pressure.

I was asked what would happen if I gave too large or too heavy a treatment. I do not know. I can just conjecture, because I am very careful about it. May I call upon Dr. Lurie for assistance?

Dr. William A. Lurie (New Orleans): I was just commenting as to what I have heard from one of our therapists, Dr. Samson, in making remarks relative to overdosage of diathermy in heart lesions. It was his opinion, and not mine, that I was trying to call Dr. Joslyn's attention to. Dr. Samson said at first there would be a softening of the heart muscles if the milliamperage was too high in relation to the size of the applicators, and there might even be some danger of weakening the myocardium, resulting in acute dilation of the heart if carried to the extreme point. This statement is not mine, as Dr. Joslyn said, but Dr. Samson's.

Dr. Arthur E. Joslyn: May I make one comment? A few years ago I heard Dr. Samson, and I don't believe he had ever treated any cases of angina by diathermy. I believe since then that he has had some experience. I believe any remarks on what *will* happen are theoretical. Anything *may* happen.

This I do want to say: If there is a chance of coronary thrombosis, I should be very reluctant about diathermy. If I had an infarct in the heart muscle with absolutely all nutrition cut off, I wouldn't want to use diathermy until healing had taken place.

A ROENTGENOGRAPHIC STUDY OF THE SELLA TURCICA IN ABNORMAL CHILDREN

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THIS study is based upon the roentgenographic examination of the sella turcica of 64 children suffering from such abnormal conditions as mongolian idiocy, childhood myxedema, thyroid infantilism, hypothyroidism, hypopituitarism, goiter, spastic paraplegia and other gross deviations from the normal.

In May, 1921, the roentgenographic findings as to the sella turcica in 104 normal children were reported. (1) That study was undertaken as an attempt to establish, if possible, normal sellar appearance and formation as a basis for comparison with the changes in abnormals. The conclusions reached were briefly as follows:

1. The shape of the sella turcica in normal children fall in a general way into three groups: A, circular; B, oval, and C, flat or saucer-shaped, with modifications in each group.

2. There is a marked variation for each age, in both the height and the length of the sella for that particular age. The average height and length of the sella shows a comparatively rapid increase in the first two years with a gradual yet irregular increase from then on up to the age of twelve years.

3. There is no relationship between the shape of the sella and the size of the head except in the case of the flat type which was always found in small heads. It does not necessarily follow that all small heads exhibit this type.

4. There is apparently no relationship between the size of the sella and the size of the head.

5. There is apparently no influence of sex on either the appearance or formation of the sella.

Our results in this series of normal children serve as controls in the series herein reported. Although the literature abounds with numerous statements as to the appearance or formation of the sella turcica in various diseases, there have been very few control studies of normal sellas.

This report deals with four problems:

1. Does the shape of the sella turcica differ in abnormal from that in normal children?

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2. Are there any characteristic differences in the formation of the sella in various types of abnormal children?

3. Is there a difference in size of the sella in normal and abnormal children?

4. Has the appearance, formation or size of the sella any clinical or diagnostic significance?

ference in the occurrence of the three groups in normal and abnormal individuals. Both the circular and oval predominate and the flat shape occurs the least frequently of all. No one shape predominated in any individual disease.

FORMATION OF THE SELLA

To appreciate properly the formation of the sella turcica as depicted on an x ray film, it is necessary to visualize the anatomical relations. It exists as a depression in the superior surface of the body of the sphenoid, limited anteriorly by the middle clinoid processes and posteriorly by the dorsum sellae, which carries the posterior clinoid process on either side of its tip. The middle clinoids are directly lateral and posterior to the olivary eminence. The sella is covered by an extension of the tentorium cerebelli which is attached to the middle and posterior clinoid processes. All of the pituitary body with the exception of the

TABLE 1

CLASSIFICATION AS TO SHAPE

DISEASE	GROUP A (CIRCULAR)	GROUP B (OVAL)	GROUP C (FLAT)
Mongolian idiocy	8	5	3
Childhood myxedema	5	3	3
Hypothyroidism	3	4	0
Thyroid infantilism	0	2	1
Goitre	2	0	0
Hypopituitarism—			
Obesity in female	0	1	0
Froelich syndrome	1	1	1
With hypothyroidism	0	1	0
Microcephalic idiocy	2	0	0
Hydrocephalic idiocy	1	2	1
Behavior disorder	2	1	0
Spastic paraplegia with mental delinquency	1	4	0
Epilepsy	1	0	0
Moron	0	3	0
Muscular dystrophy with mental delinquency	1	0	0
Congenital idiocy	1	0	0
	28—43%	27—42%	9—15%

SHAPE OF THE SELLA

Round and oval shaped sellas are found in equal proportions as shown in table 1. In our normal series (table 3) we found that the circular or round sella was more frequently seen. Camp (2), who used our classification in a study of 1,000 sellas, mostly of adults, also found that the circular and oval predominated, but in a different ratio than ours, namely: circular, 22.5 per cent; oval, 67 per cent; flat, 15 per cent. This comparative study of the four series demonstrates that there is little dif-

case of the infundibulum lies below this tentorial extension. The anterior clinoid processes are formed by the mesial ends of the posterior border of the lesser wings of the sphenoid; they are located at a considerable distance lateral to and above the diaphragma sellae and hence the olivary eminence and the optic chiasmal groove are extrasellar. The difference, then, in configuration of the sella caused by the differ-

TABLE 2

CLASSIFICATION AS TO PRESENCE OF EXCAVATION

DISEASE	UNCOVERED	COVERED	NOT SHOWING
Mongolian idiocy	6	6	3
Childhood myxedema	3	5	2
Hypothyroidism	2	3	0
Thyroid infantilism	2	1	0
Goitre	0	2	0
Hypopituitarism—			
Obesity in female	1	0	0
Froelich syndrome	0	1	2
With hypothyroidism	0	1	0
Microcephalic idiocy	1	0	1
Hydrocephalic idiocy	1	2	1
Behavior disorder	1	2	0
Spastic paraplegia with mental delinquency	2	2	1
Epilepsy	1	0	0
Moron	0	2	1
Muscular Dystrophy with mental delinquency	0	1	0
Congenital idiocy	0	1	0
	20—33%	29—48%	11—18%

TABLE 3

COMPARISONS BETWEEN SELLAS OF NORMAL AND ABNORMAL CHILDREN

A—PRESENCE OF EXCAVATION

	NORMAL	ABNORMAL
Present—Covered	29 sellas—38%	29 sellas—48%
Present—Uncovered	30 sellas—39%	20 sellas—33%
Not present	17 sellas—22%	11 sellas—18%
Present—Covered and uncovered	77%	81%

Irrespective of mental condition of child, the excavation was demonstrable either covered or uncovered in 79% of all sellas studied.

B—SHAPE OF SELLA

	NORMAL (First Series)	ABNORMAL
Group A (Circular	66%	43%
Group B (Oval)	24%	42%
Group C (Flat)	10%	15%

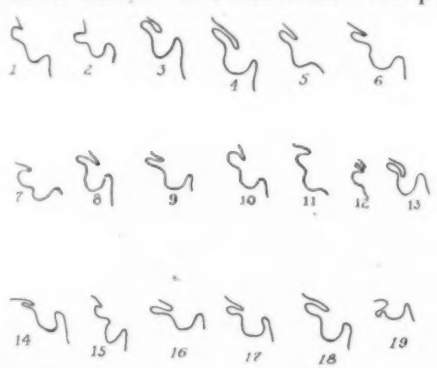
ence in position of the anterior clinoid processes and variations in height of the olivary eminence can mean absolutely nothing referable to the pituitary body.

Timme (3) in 1921 reported that "in 23 out of 24 cases of mongolian idiocy, radiographs of the skull showed a peculiar change from the normal in the anterior fossa pituitaria. This change consisted in an excavation under the anterior clinoid processes and presumably under the olivary process and optic groove and the excavation itself communicated directly with the anterior portion of the fossa itself." As corroborative evidence that these findings were abnormal, he offered for comparison a sella from a normal Chinese girl 13 years of age which did not present this excavation. He further stated that "the excavation is seen occasionally in persons who have not Mongolian characteristics, but who have isolated symptoms and signs due to anterior lobe disturbance, namely, growth and genital developmental abnormalities."

In our first paper we stated that in normal children we found that "in some instances the anterior clinoids are raised above the level of the middle clinoids and are very long. In these latter cases a slit is seen running anteriorly from above the middle clinoid processes under the anterior clinoids. This slit is no way a part of the sella."

This excavation is made up below of *the* optic chiasmal groove anteriorly and the olivary eminence posteriorly; above by the posterior portion of the inferior surfaces of the lesser wings of the sphenoids, the tips of which are the anterior clinoid processes. In this paper we have designated the excavation as being either uncovered or covered. By an uncovered excavation is meant one in which the lesser wings of the sphenoid are high enough to permit a visualization of the slit in the lateral view. This is the type described by Timme and by ourselves in the first paper. In addition to this formation, we now find that in a large number of cases, both normal and abnormal, the slit is easily made out, but it is covered by the lesser wings of the sphenoid as shown in figures 3 and 4. This we have termed a covered excavation or slit.

Tables 2 and 3 show the incidence of each type of excavation in each individual disease studied and also in normal children. The uncovered excavation was found in 33 per cent of the sellas of abnormal children and in 39 per cent of the normal. The covered excavation was present in 48 per cent of the abnormal and in 38 per cent of the normal children. The excavation was pres-

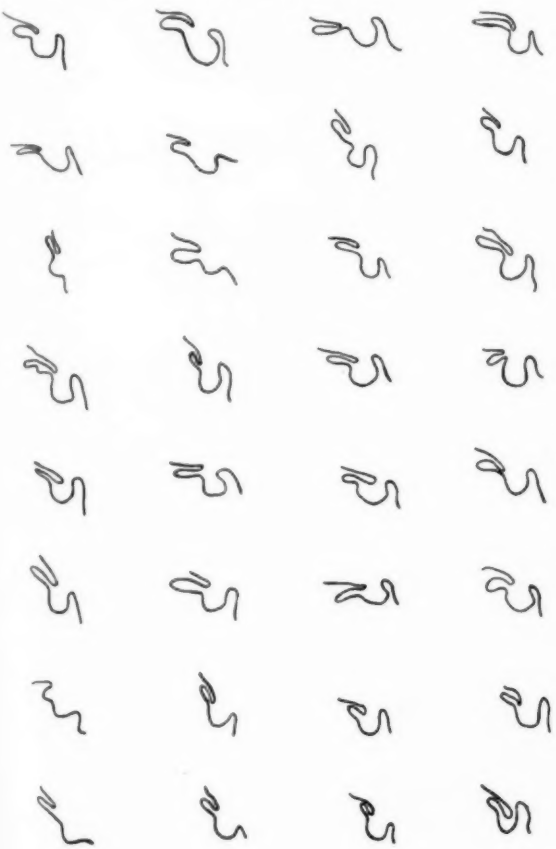


SELLA IN ABNORMAL CHILDREN SHOWING UNCOVERED EXCAVATION

Figure 1

ent, either covered or uncovered, in 79 per cent of all cases studied, irrespective of the mentality of the child.

Even a casual examination of figure 1 will demonstrate that it is impossible to differentiate by means of this excavation between the sellas of the various diseases: Mongolian idiocy (Nos. 3, 4, 5, 6), childhood myxedema (No. 8), hypothyroidism (Nos. 9, 10), epilepsy (No. 13), hydrocephalic idiocy (No. 16), behavior disorder (No. 17) and spastic paraplegia with mental delinquency (No. 18).



SELLA IN NORMAL CHILDREN
SHOWING UNCOVERED EXCAVATION
Figure 2

Similarly, every variation and type of the abnormal group is duplicated in the normal (Fig. 2).

Comparison of the covered excavations found in the abnormal (Fig. 3) and the normal groups (Fig. 4) shows that it is also impossible to differentiate by means of the excavation between normal and abnormal.

A smaller group is shown in figure 5, in which the excavations are not seen. This type, though it is the most infrequent, is generally accepted as the normal. Here also every variation of formation and con-

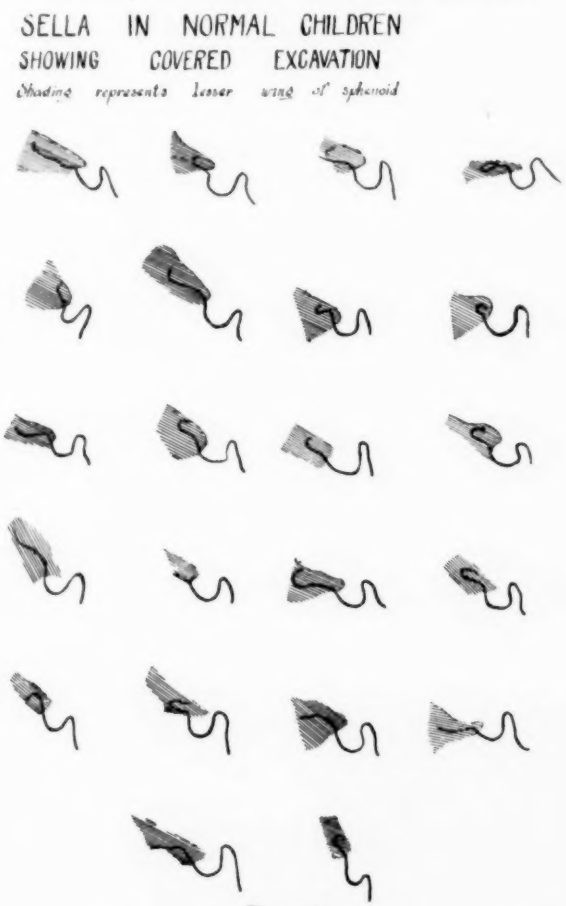


Figure 3

tour appearing in the abnormal children is duplicated in the normal.

The characteristics of the anterior and posterior clinoid processes show the same variations in size, shape and development in the sellas of abnormal children as were found in those of normal children. Only one sella showed bone changes and that was in a hydrocephalic idiot who presented a type C sella with poorly developed dorsum sellae with probable absorption of the anterior clinoid processes since they were not seen. No slit was demonstrable due to the absence of the anterior clinoids.

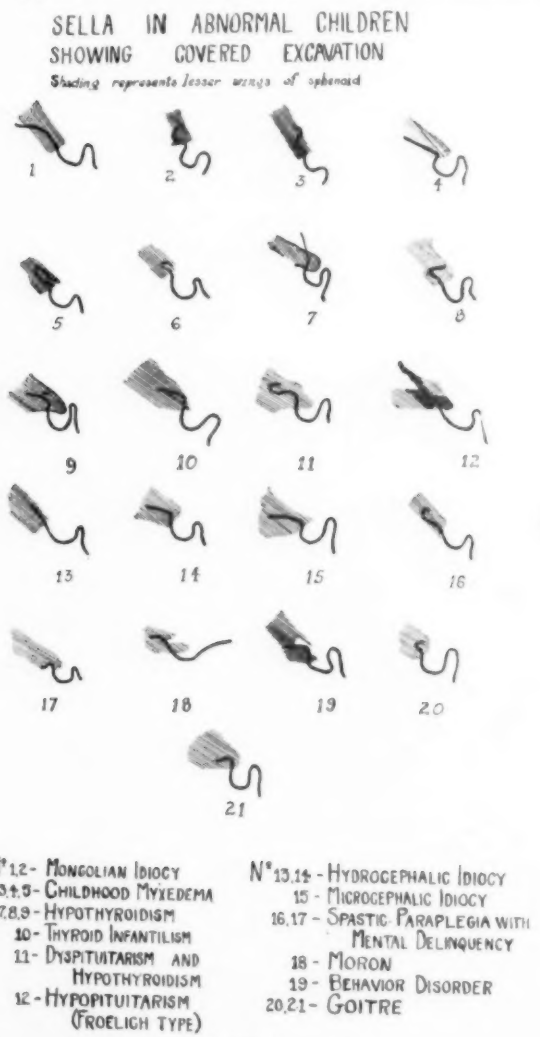


Figure 5

SIZE OF THE SELLA

The variations in the normal series were so great that it was difficult to arrive at an average for any particular age. The same variations in size are noted in this series, and it is therefore more difficult to state whether the changes in size are due to the

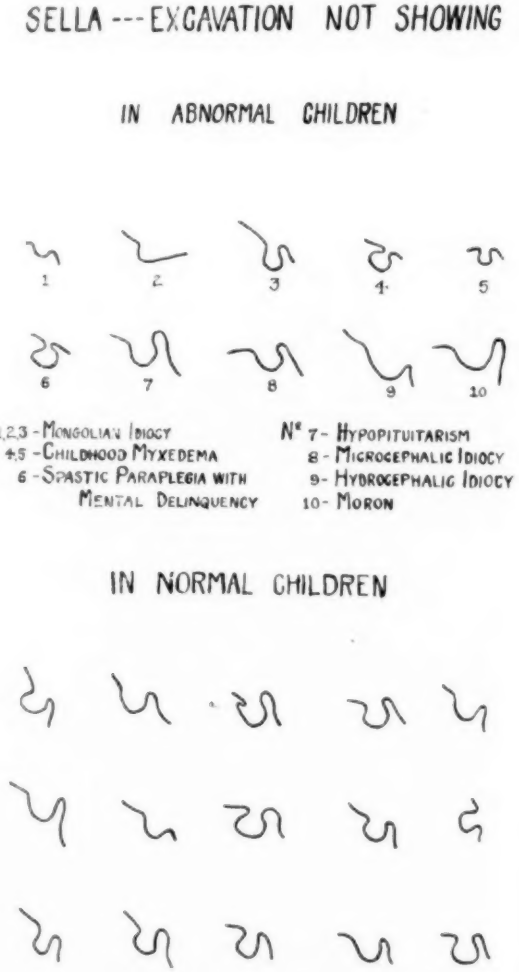


TABLE 4

SIZE OF SELLA TURCICA IN VARIOUS DISEASES COMPARED WITH THAT IN NORMAL CHILDREN*

AGE	SIZE	NORMAL
MONGOLIAN IDIOCY		
14 mos.	8x4 mm.	7x5 mm.
7 yrs.	9x8	9x8
10 mos.	5x4	8.5x6
2 yrs.	10x3	8x6
12 mos.	7x4	7x5
12 mos.	7x4	7x5
2 yrs.	10x7	8x6
3 yrs.	9x6	7x6
12 mos.	1x6	7x5
10 yrs.	5x4	8.5x7.5
2 yrs.	6x6	8x6
9 yrs.	10x5	8.5x7
7 yrs.	11x7	9x8
12 mos.	10x6	7x5
5 yrs.	6x5	8x7
THYROID INFANTILISM		
6 yrs.	9x6	8x6.5
3 yrs.	7x4	7x6
3 yrs.	4x3	7x6
MICROCEPHALIC IDIOCY		
15 mos.	8x5	7.5x6
8 yrs.	7x6	8x7
HYDROCEPHALIC IDIOCY		
5 yrs.	11x5	8x7
21 mos.	9x6	8x6
8 yrs.	8x7	8x7
2 yrs.	12x8	8x6
SPASTIC PARAPLEGIA WITH MENTAL DELINQUENCY		
2 yrs.	8x4	8x6
2 yrs.	7x4	8x6
13 mos.	7x5	7x5
2 yrs.	1x5	8x6
4 yrs.	5x5	7.5x6.5
MUSCULAR DYSTROPHY WITH MENTAL DELINQUENCY		
7 yrs.	7x7	7.5x7
CHILDHOOD MYXEDEMA		
6 mos.	9x3 mm.	8.5x6 mm.
12 mos.	9x5	7x5
3 yrs.	8x4	7x6
3 yrs.	6x5	7x6
3 yrs.	7x2	7x6
6 mos.	7x3	8.5x6
5 yrs.	7x7	8x7
HYPOTHYROIDISM		
4 yrs.	10x4	7.5x6.5
28 mos.	8x5	8x6
4 yrs.	9x6	7.5x6.5
2 yrs.	9x4	8x6
3 yrs.	8x7	7x6
7 yrs.	6x7	9x8
7 yrs.	7x9	9x8
GOITRE		
7 yrs.	7x9	9x8
8 yrs.	8x8	8x7
HYPOPITUITARISM		
13 yrs.	10x6	10x8
13 yrs.	12x5	10x8
12 yrs.	10x6	7.5x6
12 yrs.	8x9	7.5x6
BEHAVIOR DISORDER		
6 yrs.	10x7	7x6.5
6 yrs.	9x7	7x6.5
8 yrs.	8x7	8x7
EPILEPSY		
6 yrs.	8x8	7x6.5
MORON		
10 yrs.	11x7	8.5x7.5
8 yrs.	10x8	8x7
CONGENITAL IDIOCY		
4 yrs.	7x5	7.5x6.5

*Normal figures taken from averages in first paper.

disease or whether they represent the same normal variations. It seems, however, that the type of disease has apparently no influence on the size of the sella, for the differences are not constant enough for any one disease to be of value. For instance, in three cases of infantilism with, of course, small heads, the sella of only one was smaller than the average for that age. In large heads such as met with in hydrocephalic idiocy, two showed sellas larger than that generally seen at the age of the child. One of these was in the largest head in the series, the largest sella and the only one showing bone absorption. As evidence that the size of the sella is *per se* of not much importance, it may be stated that sellas of almost the same size were found in a case of Froelich syndrome with normal mentality and in a moron, both with normal sized heads. The various types of diminished thyroid activity did not present any essential difference in size from those with goiter. Mongolian idiocy and hypopituitarism showed some of the largest sellas encountered in the series, but with not enough regularity to make it of etiological or diagnostic importance.

SUMMARY

Studies were made of the contours of the sella turcica in 64 abnormal children. The findings were compared with those of 104 normal children. It was found that the shape of the sella does not differ significantly in normal and abnormal children. The type of disorder is not correlated with the shape of the sella. Round and oval shapes predominate both in abnormal and normal children and flat sellas are the least frequent.

The formation of the sella does not differ in abnormal children from that in normal children. There is no formation characteristic of any individual disease. The excavation that has been described in Mongolian idiots is extrasellar. It may be uncovered or covered by the lesser wings of the sphenoid. It is a normal foundation found with the same frequency in all children and is not characteristic of any known disorder.

The size of the sella is not influenced by any of the diseases studied. As in the normal series, there was found no relationship between the size of the sella and the size of the head nor between the shape of the sella and the size of the head.

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X RAY TREATMENT OF AORTIC ANEURYSMS: A PRELIMINARY REPORT

S. A. Levey, M. D.
St. Louis, Mo.

THE treatment of aortic aneurysms has long been considered as strictly within the field of surgery. Or, as has been aptly said, "Surgery, with the help of God." This is considering those aneurysms which have progressed beyond the stage of medicinal control. What the results have been is not for one of my limited surgical experience to state. The courage and resourcefulness of the cardiac surgeon has long been the subject of my great admiration.

Having had occasion to witness the sufferings of people afflicted with aortic aneurysms I have attempted to do something toward the alleviation of their condition. Considering the fact that I have had but four cases of this type, this must necessarily be considered in the nature of a preliminary report. The results obtained, however, warrant the presentation of this technique to you. Before going into the details of x ray therapy, I should like to briefly call attention to a few facts which are pertinent to the aneurysmal formation.

ETIOLOGY AND PATHOLOGY

The majority of aortic aneurysms are of luetic origin. Their improvement under antiluetic treatment is unusually rapid. Most aneurysms occur in the anterior portion on the right side of the ascending arch. In passing, I might say that the aorta is usually divided into four parts; that is, the ascending arch, the transverse arch, the descending arch, and the thoracic aorta. All aneurysms are preceded by a stage of inflammation. This may be a sequel to an infectious disease or a pnuemonia, endocarditis, septicemia, etc. This aortitis is followed by a state of degeneration, the areas of which gradually extend, invading the blood vessel coats and causing a weakening of the inner or middle coat or both. These coats, being largely composed of elastic tissue, allow the bulging and tumor mass formation which is caused by the blood pressure against the weakened section. Since the function of the aorta is primarily that of a pressure chamber to keep up a smooth, even flow of blood to the arteries, the elasticity of its walls are of great importance. For by this means the organ performs its duty.

CLASSIFICATION

Aneurysms may be divided into three general classes: Sacculated, fusiform, and dissecting. The first type is one in which the opening into the aorta is smaller than the diameter of the sac. This type usually produces more symptoms of extracardiac pressure than the others. The fusiform type is spindle shaped and has a larger opening into the aorta. The dissecting type burrows between the coats of the blood vessel.

*Read before the American College of Physical Therapy, Chicago, Oct. 21, 1925.

TREATMENT

In the treatment of these cases the ideal result would be a restoration of the entire normal elasticity of the blood vessel walls. If one cannot achieve this result a marked benefit would be obtained by reducing the size of the tumor mass, strengthening the walls by a fibrous tissue formation. It is my belief that by this last method do we obtain results through x ray therapy. To do this it is necessary to use rays of such penetration that a considerable proportion of them would stop in the diseased tissue; for it is well known that only these rays are of any use. After numerous experiments the following technique was adopted: Using a seven inch transformer, activated by a 220 volt current, a penetration of 82 peak kilovolts, equivalent in our laboratory to a five inch spark gap between points, with four ma. of current at an eight inch target-skin distance with a filter of one-half mm. of rolled aluminum, an exposure time of one and one-half minutes was used. This was repeated in three days. After four to six treatments, the treatments were lengthened to two minutes and the patient treated once a week. The total time of treatment took from three to four months. Under fluoroscopic control, the aortic enlargement was mapped out. At first only the area corresponding to the aneurysm was treated. Later this was changed, and an area extending for two inches in all directions beyond the outline of the sac was used. You will note that the amount of radiation used was far below the erythema dose. The stimulation of the cardiac musculature and the other tissues immediately surrounding the aneurysm apparently assisted the recuperation of the aortic walls. The anterior part of the chest was used as a portal of entry. In stout people, the left axilla was used as an additional portal, giving a dose of one minute in addition to the regular dose over the anterior chest wall.

The symptoms of pain and numbness of the left arm and shoulder usually disappear after the second treatment. In one case they persisted for four treatments. This was a case of a transverse arch aneurysm having a fairly marked laryngeal cough and hoarseness. The cough and hoarseness disappeared gradually following the third treatment. The blood pressure readings showed a gradual improvement, coming to normal in about two months following the institution of treatment. The dyspnoea gradually improves along with the use of the left arm, until, as one patient said, "I suddenly found that I could again do my housework without any inconvenience." I shall not burden you with all the case reports, but shall cite one which is rather interesting.

CASE REPORT

MX., white, male, age 74. Height 5 feet 7 inches, weight 130 pounds; poorly nourished.

COMPLAINT: He complained of swelling of the lower limbs, shortness of breath, hoarseness and a persistent cough. In addition, he states that both arms felt weak and numb, the left one being much worse. There were dull pains in the left shoulder and arm.

DEVELOPMENT: Medical treatment had been used, but the results had not been encouraging. The possibility of syphilis had been ruled out.

EXAMINATION: A weakness and a delay in the pulse at the left radial artery was noted. Blood pressure of the right arm was 145 over 90; left arm 110 over 60. Pulse 95, respiration 24, shallow and harsh. Fluoroscopy and plate showed a widening of the entire aortic arch with an upward and posterior bulging of the transverse portion. A pulsation was noted in this bulging. The dilatation was fusiform in shape. The width of the aorta, in the anteroposterior position, was 12 c.m., approximately 4½ inches. The walls of the aneurysm were thin and indistinct.

TREATMENT AND PROGRESS: This patient was treated twice a week for three weeks and then once weekly for three months The dyspnoea and hoarseness gradually disappeared after the third treatment. The pain in the left arm and shoulder persisted until after the fourth treatment. After three months the aorta showed a transverse width of 8½ c.m., with no pulsation and only a slight posterior bulging of the transverse arch. The walls were well defined and clear cut. This man has not been treated for several months. Within the past month he went through an attack of bronchial pneumonia without unusual difficulty. He is now 76 years old. Following his last illness I examined him and found the aorta unchanged, but there was a marked increase in the size of the ventricles. This hypertrophy was probably a compensatory result of the pulmonary infection.

CONCLUSION

When it is considered that, under ordinary treatment, it has been estimated that at least half of the cases terminate in rupture of the aneurysmal sac with instantaneous death, or death in a few days, one is tempted to try anything that may prolong life. The final outcome of these cases under x ray therapy is as yet undetermined. Even if it be necessary to treat these patients at intervals for any conditions which might be due to a recurrence of the original aneurysm, still we have accomplished something. When one has seen a dilated, bulging aneurysm, in a gasping, pain-stricken patient, change into a smooth, nonpulsating, smaller organ with apparently normal function and tremendous relief to the patient, truly he will feel that his efforts have not been in vain.

DISCUSSION

Dr. T. T. Gibson (Middlesboro, Ky.): This paper recalls to mind a fellow practitioner in a neighboring state who was down-and-out physically; he was too tired for work. He came in to see me to see if I could do anything for him, and I found a very large aneurysm. Also his blood test showed a four plus Wassermann. I used roentgen therapy on this doctor for a period of several months, also gave him doses of salvarsan. His Wassermann never did get lower than four plus, but he went back to active practice for a period of more than three years. He died suddenly.

Dr. J. H. Carpenter (Chicago): From observation in the treatment of syphilis with the x ray, I would be very much inclined to doubt

the effectiveness of the treatment from an x ray standpoint. It has been my experience that it is one of the conditions that does not respond to the x ray. Regarding the treatment of the aorta and the reducing of a bulging on the posterior wall, treating anteriorly with the spark gap that the doctor mentioned, I should be quite inclined to be skeptical, because I think the blood stream would filter out all of the x ray that would reach the part.

Dr. S. A. Levey: I thought I made it clear that the luetic aneurysms were not the type which I treated. As to Dr. Carpenter's remarks, we started this treatment using as high as nine inch back-up. One case was treated with a twelve-inch back-up. I use back-up to designate the spark gap. The results obtained by the five inch back-up were so far superior to any of the other voltages that we have discarded them entirely. It is my belief that the majority of us in our treatments are using voltages far beyond what is necessary to reach the part we are treating. We know that we can radiograph any part of the body and get pretty good results with a five-inch back-up. We can penetrate any part of the body with 82 peak kilovolts, equivalent to approximately 65 kilovolts or a so-called five-inch spark gap.

Why should we attempt to treat, with penetration which will almost go through a brick wall, conditions of soft tissues with the interposition of some cartilage with comparatively thin bone; I mean the sternum and the ribs and the soft tissues almost directly beneath them? We do not have the material to stop the rays, yet we want the rays which are going clear through, to stop at the pathological lesion. That is why, as I say, we started out with the nine-inch spark gap, went to twelve, dropped back to seven, and then to six, and came to five and stayed there. I have tried it with even three and a half inches, but I did not reach the part.

NEW EQUIPMENT

WANTZ MULTIPLE WAVE GENERATOR

VICTOR X RAY CORPORATION
Chicago

NEVER was there a more propitious time to announce something of immediate interest and value to the physiotherapeutic branch of medicine. This announcement comes not as a result of a few months' seclusion of engineers in experimental pursuit of "something new," but represents the embodiment of accumulated thought—medical, electrical and mechanical—over a period of years.

The Wantz Multiple Wave Generator delivers primarily the following currents:

Galvanic
Surging Galvanic
True Sinusoidal of selective frequency
"Wantz-Pacini" current.

THE GALVANIC CURRENT

The ideal source for direct current is the voltaic or galvanic cell, but obviously this

is impractical, so today we utilize the ordinary lighting current and by conversion of that energy seek the nearest approach to the ideal. The prevailing commercial lighting current in cities and towns is alternating, at the rate of 60 cycles (120 alternations) per second. This current is sometimes referred to as sinusoidal, although from a therapeutic standpoint it is a misnomer.

Instead of attempting to rectify this alternating current by interposing a chemical or a mechanical rectifier, a motor generating set has been incorporated, the motor of which is energized from the lighting circuit, and through its shaft actuates the direct current generator.

In any direct current generator, especially the smaller units where the number

Fig. 1.—Wantz Multiple Wave Generator.

of commutator bars is necessarily limited, the current generated, although unidirectional, is pulsating in character due to the voltage difference between the commutator bars. This condition has been met by the introduction of what may be called a special filter coil in series with the generator terminals, the purpose of which is to smooth out these ripples (pulsations) by an inductance effect. The resulting current is of a smoothness never before obtained in apparatus of this nature.

The galvanic current thus emanating is taken off the two *fixed* commutator brushes of the generator.

THE SINUSOIDAL CURRENT

In addition to the fixed commutator brushes above mentioned is a pair of *movable auxiliary brushes* which when oscillated over the commutator produce a true sinusoidal current. This is readily explained from the fact that in every generator there is a neutral (no voltage) point approximately midway between the *fixed* generator brushes. When the auxiliary brushes are oscillated over the commutator it causes them to pass this neutral point. Thus is obtained a gradual rise from zero to maximum voltage, then gradually back to zero again on *each* half of the complete cycle, as shown in the diagram (Fig. 2).

It is important to here bear in mind that this sinusoidal current passes through the filter coil in the same manner as described for the direct current, to smooth out the ripples (pulsations) incident to direct current generators. This refinement eliminates the usual faradic sensation.

SURGING GALVANIC CURRENT

As explained in the aforegoing, when the paired auxiliary brushes are oscillated over the commutator of the generator, the current passes through both the positive and negative values. A surging galvanic current is taken from the generator by connections to one fixed commutator brush and one auxiliary (oscillating) brush. Thus is obtained:

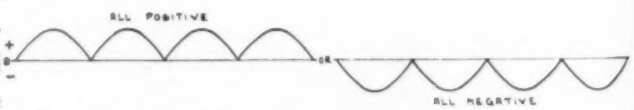

Fig. 3.—Surging Galvanic Current.

The selection between *all positive* or *all negative* flow is made simply by turning a switch which reverses the polarity.

INTRODUCING THE 'WANTZ-PACINI' CURRENT

This current is not introduced as an innovation, but is embodied because of its

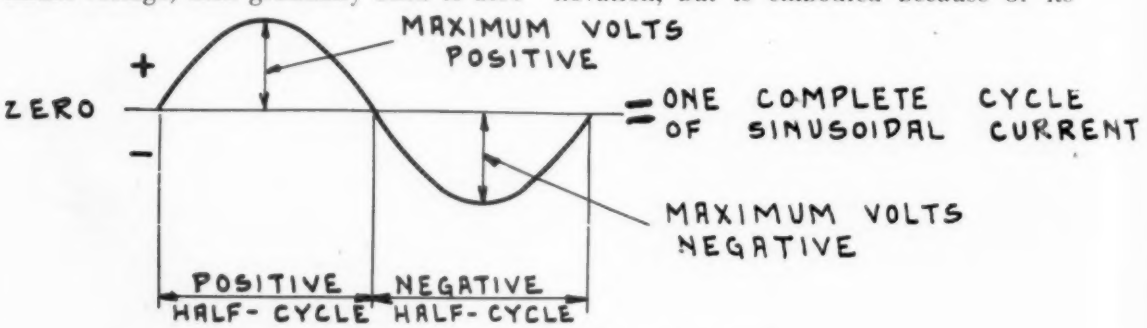

Fig. 2.—Diagrammatic explanation of a true Sine current.

distinct therapeutic values. It is obtained by a device connected to the generating unit, which very rapidly cuts in and out a high resistance unit, thereby superimposing, on the sinusoidal current for instance, a definite effect which, graphically, is this:

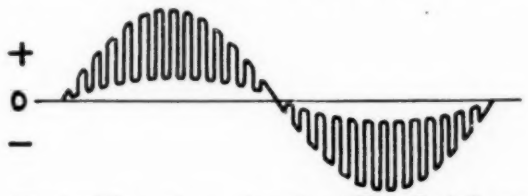

Fig. 4.—Effect of superimposing "Wantz-Pacini" current on the sinusoidal current.

It will at once be observed that there is a distinct difference between the above interrupted sine wave and the usual which appears somewhat like this:

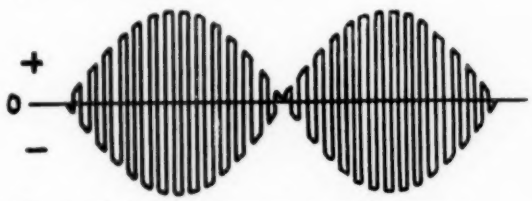

Fig. 5.—Ordinary Interrupted Sinusoidal Current.

By the new method interruptions confine themselves to the respective wave of the cycle, i. e., all positive in the first half and all negative in the second.

A line switch is situated in the center of the front panel, and a simple turn of the operating handle to the left or right gives the main control, "on" or "off." The line current is brought direct to the motor which through its shaft operates the direct current generator. The speed of the motor is governed by a rheostat, varied resistances being had through the rack and pinion adjustment, designated "Intensity Regulator." Varying this resistance, therefore, varies the speed of the motor, which in turn varies the output of the direct current generator. At all times, therefore, the full output being generated by the latter is utilized, and regulation of its load obtained without sacrifice of any desirable current characteristics.

This arrangement supersedes the old method of placing the resistance in series with the generator itself. The advantage of this newer method lies in the fact that the change of current while it is being regulated is gradual, and because of no sliding contacts in the patient's circuit it is smoother and more pleasant to the patient, and that is indeed of utmost importance.

INGENIOUS DEVICE ASSURES ABSOLUTE CONTROL OF FREQUENCY AND SHAPE OF SINE WAVE

As has been explained in the foregoing, a true sine wave is obtained by the oscillation of the two movable auxiliary brushes over the commutator. Obviously, it is desirable to have means for selecting at will any number of sine waves per minute, as the treatment may call for. In the Wantz Multiple Wave Generator, the operator may select one of two ranges of frequencies, 5 to 15 per minute or 15 to 100 per minute, by turning the hand switch (located immediately in front of the milliameter) to the left or right. Then with the opposite hand switch (located immediately in front of the voltmeter) a very fine graduation over either of these ranges is obtained.

Every physician who has had experience in the use of galvanic and sinusoidal appa-

ratus will appreciate the fact that he may change the intensity of the current while the patient is in the circuit, without discomfort to the latter. No necessity of switching off the current completely and changing the treatment cords from one set of binding posts to another, as formerly.

This control is absolute and positive.

PRINCIPLES OF THE EDDY CURRENT MOTOR USED FOR SINE WAVE CONTROL

While it seems almost impossible to so describe this controlling mechanism as will enable the reader to visualize it, an explanation of the fundamental principles involved will no doubt help toward an understanding of how this means for absolute control has been achieved.

The primary object, of course, is to vary the speed of the oscillating brushes on the commutator of the generator, which in turn determines the number of sine waves per minute. This movement (oscillation) of brushes is by means of a rod which has a reciprocal movement, and having at one end a roller bearing.

In order to actuate the reciprocal arm which in turn governs both the speed of the oscillating arm and the wave shape, an eddy current motor is introduced.

The eddy current motor is mounted in the lower part of the casing, and at the upper extremity of its shaft carrying the disc are two gears, either of which engages one of the corresponding two gears on another vertical shaft which terminates in contact with the roller bearing of the reciprocal arm which oscillates the auxiliary brushes. The hand switch previously mentioned serves to enmesh these gears selectively, according to the requirements at hand.

With either of these two primary speeds a finer adjustment is made through the hand switch in front of the voltmeter. This finer control is obtained through the governor of the eddy current motor.

From the fact that the slightest fluctuation in the speed of rotation of the motor will change the shape of the sine wave (therefore its therapeutic effect), one quickly realizes how important it is that its speed be stabilized. There are no electrical contact points nor springs involved in the eddy current motor, and its action is therefore positive. The magnetically produced speed which has the characteristic of consistency, is in this instance even further augmented by a finely adjusted governor.

SELECTIVITY OF CURRENT

The third switch on the right of the front panel gives the operator primary selection between the three currents, galvanic, sinusoidal and surging galvanic. The smaller switch just below it is used optionally when it is desired to superimpose the "Wantz-Pacini" current on any one of the three currents mentioned.

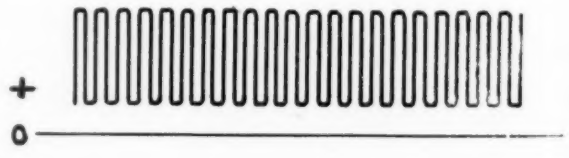

Fig. 6.—Effect of superimposing "Wantz-Pacini" current on the galvanic (direct) current. Note that the voltage does not touch the zero line at any point.

A SINGLE PAIR OF BINDING POSTS

These binding posts are on the extreme left of the front panel. From the fact that all changes in the nature of current are made by the hand switch above described, the treatment cord connections may be considered permanent. In fact, it is not even necessary to change these connections when a reversal of polarity is desired, as this, too, is made by a hand switch.

HOW THIS MACHINE CONTRIBUTES TO STANDARDIZED PHYSIOTHERAPY

The physician using apparatus of this kind would like to have the assurance, when comparing his results with those of other physicians in various parts of the country, that a stated quality and quantity of current used by a confrere 2,000 miles distant, is identical therapeutically when obtained from his own machine. This very desirable and important requisite is one of the outstanding features of the Wantz Multiple Wave Generator. Regardless of whether the machine is to be operated from an alternating or direct current lighting circuit, the motor-generator set is always incorporated, therefore the current delivered to the patient is always of the same characteristics. This supersedes the older method of eliminating the motor-generator set when operating from a direct current lighting circuit, and simply interposing a resistance unit between the lighting circuit and the patient. Therefore, in the Wantz Multiple Wave Generator is realized another important contribution toward *standardized* physiotherapy.

There is also a complete avoidance of shunt connections. Such precautions, in every detail, serve to eliminate the undesirable faradic effect on the currents delivered by the machine.

COMPACTNESS

The overall dimensions of the apparatus are $8\frac{1}{2}$ inches high by $15\frac{3}{4}$ inches square. This compactness is an advantage, since the accessibility to all parts has been made possible without interfering with the condensed arrangement of the various elements. The improved and simplified system of wiring, reducing considerably the number of connections and conduits, also contributes to compactness.

EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

A Journal of Ideas and Ideals.

A. R. HOLLENDER, M. D., Editor
ALBERT F. TYLER, M. D., Managing Editor

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Physical Therapy

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—of—
Physical Therapy

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A. R. HOLLENDER, M. D.
Chairman Program Committee

PHYSIOTHERAPY

From the Surgeon's Angle.

Mr. Chairman and Gentlemen: It is a great pleasure for me to be with the College tonight. We all practice a specialty now, more or less, because medicine has grown to be such an enormous field that it is almost impossible to be a universal genius and practice everything. Only the poor, general country practitioner has to be such a genius now, for living in a city or in the larger communities we are all practicing specialties.

I have personally been in the fortunate or unfortunate position of a surgeon. But in practicing our surgery we have come to

make use of physiotherapy both during our active treatment and after we get through with our cases, because it bridges our patients over many unpleasant periods of after-treatment. We particularly like to use electricity. It has definite indications, is not dangerous and we are all aware of its value in a large number of selected cases.

We also use hydrotherapy, while taking a good many precautions. Let me tell you an incident which occurred in my early practice in Chicago. We used to treat many cases of light fevers with hydrotherapy, and my very esteemed and very good friend, Dr. Fenger, whom you perhaps remember, had a large number of cases in my neighborhood of light fevers in the cases of children. He always made very good use of hydrotherapy, for he was a great friend of hydrotherapy. I was called in on one of his cases. Everything was going alone fine, for he was prescribing hydrotherapy. I could not prescribe anything better, so I said to the people, "The doctor is doing just what should be done. The child will get well." They did not receive this information with much enthusiasm and I knew that they would not have me again, so I added a little permanganate of potash to the water to make it red. They enthusiastically used it and it worked wonders.

So you see in the application of hydrotherapy as in any other therapeutic measure we must take into consideration people's minds, fancies and views. This rule holds in the successful application of all medical therapeutics.

I was asked to relate some of my early reminiscences, but I would rather tell you something of your great *College*. I happened to meet Dr. Winternitz in Europe, one of the early hydrotherapy pioneers. He was one of the great men who first took up hydrotherapy scientifically. He told me himself that many times he had thought of using methods inspired by his experiences in his travels. He traveled to Italy, for instance, where he visited Pozznoli, which I also visited years afterward. There is a crack in the rock, which permits you to enter that mountain; you have to take off your coat; you begin to sweat profusely. In fact, you cannot stand the heat from that cave. Two little children were sent down to drop an egg into that water and they brought it out hardboiled. At least we can assure you of this—the waters are surely hot. These baths are called the Veronian baths. They were used at this time to cure rheumatism. Here Winternitz learned many lessons.

Winternitz has rightfully been called the father of hydrotherapy. It was my pleasure to visit his institution early. I also visited there about thirty years later, in 1921, and I was favorably surprised to see what advances it has made.

This brings me to a point which I think will be of interest to you. While we have in this country a larger number of wideawake physiotherapists, we have very few institutions that can compare to the poorest in some of the capitals and some of the country resorts in Europe. Wiesbaden in Germany, Nauheim in Germany, and Vichy in France, although they are not as rich as we are, have the most wonderful institutions for hydrophysiotherapy. But they do not have the wideawake and active men that we have. Never fear, we will develop in time, and it is up to you and me to see that it is done on a scientific basis. Especially

in places like Nauheim and Weisser Hirsch, near Dresden, is physiotherapy founded on a true scientific basis.

Another man whom I have had the pleasure to know very intimately and who is one of my old friends is August Rollier. I knew Rollier as a student in Kocher's clinic and later kept his acquaintanceship while he was acting as an assistant in Kocher's clinic. I met him a number of times later, particularly in 1913 in the Congress in London, where we spent a good deal of our time together. At that time, 1913, I went with him and visited him and his wife in Leysin. Since that time I have been there two or three times. I have seen the place grow from its infancy. Perhaps a word could be said about the resort at this time, for I have been much interested in it, and have observed it carefully.

Perhaps you are acquainted with the fact that I have instituted a bismuth treatment for tuberculosis. This treatment has given us great results in cases of tuberculosis, but our cases were nothing compared with the results obtained by Rollier in his treatment by sunlight. When I first visited him in 1913 it was a small place with perhaps 250 or 300 patients. We photographed a number of these cases, and he gave me a great many of his pictures and plates to bring back with me and demonstrate in this country. When I was in Leysin two years ago he had 14,000 cases. There were 14,000 cases of tuberculous people there that were not only of a surgical nature, including lung tuberculosis, but he had a half dozen other conditions filling his sanatoriums and benefiting under his treatment. Rollier himself is in charge of thirty institutions. His oldest place is a little old hut; he still keeps it and lives close by the original tent in which he lived. This hut remains unchanged, but the new places have all been modernly constructed.

I have been after Rollier ever since to come to this country; and he agreed in a letter of only a few days ago to come to this country to tell his experiences. He is not only a pioneer of physiotherapy, he is a surgeon through and through of the very highest calibre. But he is not well, he has been sick. He has suffered a very severe case of pneumonia, from which he has been very slowly recuperating. He had promised to come this fall; now he promises to come as soon as he feels well. He believes he will probably be able to come in the spring.

I have already announced his coming to a number of societies, and he will lecture particularly in Arizona, in California and in New Mexico.

He also is interested in another field which may be very usefully propagated in this country, and that is the open air school and is a great advocate of the open air school for weak and backward children.

I could go on and tell you some interesting experiences with some of the physiotherapists in Germany. Let me only cover the high spots. As you know, Germany is a country which is preeminent in the use of physiotherapy. They have some splendid places in most of the large bathing resorts. One of the finest places which I have seen in which truly beautiful methods are used and which I later used for experiments myself was at Friedrichsbad. It was luxuriously outfitted. Two-thirds of the people

there were Americans of the wealthy class. I said to myself, "Why do these people travel three and four thousand miles? Why haven't we conditions like that in our country?" The water is the same. There is no special water there in Wiesbaden; it is a little dirtier than Michigan water, but otherwise it is the same. They ought to have some of these places in this country. Of course, there are some—I will not say we have none. There are some, yes, but compared with the size of our country and the wealth of our country, we are very poorly supplied with such institutions. I hope most of you will not see criticism but rather encouragement in these statements, for our problem is to not only imitate those methods, but improve upon them and raise the standard in our own country.

Carl Beck, M. D.

WILLIAM E. GYE HONORED

Annually a fellowship is granted by the London University to the graduate of that institution who has done the greatest service toward the advancement of the medical science in the past five years. This fellowship, besides giving recognition to its honored graduate, carries a stipend of about $1,500.

Dr. William E. Gye has been announced the winner of the fellowship this year in recognition of his work on cancer. Work that he has done should assist in forming or supporting new concepts concerning the etiology of cancer and will serve as a stimulus for further observation.

BERGONIE FOUNDATION

Jean Alban Bergonie
Born October, 1857
Died January, 1925
Copy of medallion presented to him by his students.

In recognition to the consistent scientific advancement that is being made in radiology and in appreciation of the bounteous knowledge and inspiration that is due directly to the efforts of Dr. Jean Bergonie, the celebrated radiologist, who recently died a martyr to the use of the x rays, a movement has been begun in France to raise a large fund for the purpose of organizing an institute for cancer research and therapy. The intention is to make Doctor d'Arsonval the director of this institute. Such an organization, under such a truly capable leader, should carry on scientific research that

would assist medical advancement and do justice to the honored deceased.

CANCER RESEARCH

Dr. Thomas Lumsden has been granted £1,000 a year, for six years, by the Grand Council of the British Empire Cancer Campaign to devote his whole time to cancer research. He is now carrying on experiments on rats, mice, and rabbits in the laboratory of the Lester Institute of Preventive Medicine.—"*Daily Mail*," London, Oct. 15, 1925.

ROENTGENOGRAPHY IN GASTRIC ULCER

At a recent meeting of the society of gastro-enterology, papers were presented by Heilbron, Schalij and Schoemaker on the subject of the relative value of clinical and roentgenologic examinations in the diagnosis of gastric ulcer. It may be concluded that there are few trustworthy signs of gastric and duodenal ulcers. In general, clinical examination should take precedence over all other methods. In this connection, the words of Basil Hall are appropriate: "Radiography and all the other modern scientific methods are good servants but bad masters."—J. A. M. A., 86:566, Feb 20, 1926.

QUESTION AND ANSWER DEPARTMENT

The Editor has had several requests from members of the *College* and subscribers to the Archives to establish a Question and Answer Department. This appears to be a valuable suggestion. It is desired that all readers send in questions upon which they desire information. The questions, together with the answers, will then be published each month under the above heading.

Address all communications to Archives of Physical Therapy, X Ray and Radium, 511 City National Bank Bldg., Omaha, Nebraska.

APOLOGIES

Due to some error the name of Dr. Curran Pope was omitted from the President's address, *The Past, the Present and the Future*, printed in the Editorial Section of the *Archives*, January, 1926.

AMERICAN BOARD OF OTOLARYNGOLOGY

An examination will be held by the American Board of Otolaryngology in Dallas, Texas, on Monday, April 19, 1926, and in San Francisco, California, on Tuesday, April 27, 1926.

Send applications to the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

ONTARIO DENTAL ASSOCIATION

The Annual Convention of the Ontario Dental Association will be held at the King Edward Hotel, Toronto, May 17, 18, 19 and 20, 1926. Dr. Fred J. Conboy, its secretary, assures us that an excellent practical program has been arranged. Dentists from points outside Ontario are cordially invited to attend and assume an active part in the discussion.

THE STUDENT'S LIBRARY

BOOKS RECEIVED

This column is devoted to acknowledgment of the books received. Such acknowledgment must be regarded by the sender as sufficient recognition of the courtesy until time and space permit selections to be made for review.

INTESTINAL TUBERCULOSIS: Its importance, diagnosis and treatment. By *Lawrason Brown*, M. D., Chairman of the Medical Board of the Trudeau Sanatorium, Saranac Lake, New York, and *Homer L. Sampson*, Roentgenographer of the Trudeau Sanatorium, Saranac Lake, New York. Cloth. Price, $4.00. Pp. 304, with 112 engravings. Lee & Febiger, 1926.

KIDNEY DISEASES AND HIGH BLOOD PRESSURE. Part I. Practical Manual for Physicians and Patients. By *Frederick M. Allen*, M. D. Cloth. Pp. 206. The Physiatric Institute, Morristown, N. J., 1925.

BOOKS REVIEWED

RADIOTHERAPY. By *Charles D. Enfield*, M. D., F. A. C. P. Cloth. Price $10.00. Pp. 299 with 194 illustrations. Philadelphia: Blakiston's Son & Co., 1925.

This book, as the author states, is a manual of x ray technique, interpretation and therapy designed for the medical men, *not* roentgenologists, who find it worth while or necessary to do some or all of their x ray work.

With this object in view the author proceeds to present an outline of the necessary equipment, suggest an economical arrangement and explain the physics and practical usefulness of each advocated piece. Then with a word of caution pertaining to preparation of patients for examination and protection of operator for secondary rays, he describes one good technique for each of the ordinary routine examinations and gives some very valuable points, typically illustrated, in the interpretation of the commoner lesions. By studying and following closely his suggestions, the beginner should be able to make good, readable films; and with a careful notation of these important suggestions for interpretation of the films obtained, the beginner will have a basis on which to build. Such an accomplishment can only be obtained through study and experience.

At the end of the text, Dr. Enfield devotes only a short chapter to the subject of x ray therapy, presenting only the most superficial understanding of the subject. We commend his insight and wisdom in so doing; for such a presentation is not intended to undervalue this therapeutic measure but to propogate no undue stimulus for attempting x ray treatments without further knowledge and preparation. The dangers to the patient are too great when used by other than highly competent men.

Such a text fills what has been a great gap in our roentgen advancement. Dr. Enfield is to be congratulated on his ability and art in presenting in such a clear, concise manner the rudimentary requirements for the practitioner-roentgendiagnotician.

INDEX OF TREATMENT. By Various Writers. Edited by *Robert Hutchison*, M. D., F. R. C. P., Physician to London Hospital, etc., and *James Sherren*, C. B. E., F. R. C. S., Surgeon to

London Hospital, etc. Ninth edition, revised and enlarged. Cloth. Price $12.00. Pp. 1035, with 108 illustrations. William Wood & Co., 1925.

The first edition of this text was prepared in 1907. Since that time, eighteen years, nine editions have been demanded. Its constant revision and enlargement indicates not only that the editors and contributors are eager to keep their text abreast the times but emphatically exemplifies the demand made upon the publishers by its corroborators—the general practitioners.

In the compilation of this work, ninety-six British authorities have amalgamated their medical knowledge. Of these many are internationally known, but all have good hospital connections.

In a short, concise introduction, the senior editor emphasizes some practical, common sense general principles of therapeutics and instills confidence into the reader. The subjects are alphabetically arranged and include not only the medical principles but many of the elementary surgical principles and methods are embodied as well. The therapy advised for each condition is limited to those measures which have proven most effective in the hands of the contributor. These are concisely handled and arranged in an easily comprehensible manner, readily accessible to the therapeutic inquirer.

This textbook designed for the general practitioner has without doubt proven its usefulness as a handy, readily accessible guide when confronted with a problem of therapeutics. Its possession will enrich the armamentarium of every practitioner, and can without hesitancy be heartily commended.

LECCIONES SOBRE RADIOLOGIA Y FISIOTHERAPIA. By *Dr. Filiberto Rivero*, Professor Titular Asignatura de Radiologia y Fisiotherapia de la Escuila de Medicina, Universidad de la Habana. Paper. Pp. 270. Libreria E Imprenta *La Moderna Possia*, Habana.

The contents of this interesting work is a reproduction of the lectures given by the writer to his students at the University of Havana. In its scope, a general consideration of electricity used in radiology and physiotherapy is first given.

This is followed by a discussion on radiology. In this portion of the text, radiodiagnostics is given first consideration. Radiology of the osseous system is followed by that of the cranium. The diagnostic features of radiology in the determination of diseases of the thorax receive individual attention. The digestive tract is discussed anatomically rather than pathologically. In the examination of the various portions, the position, tonicity and motility precede the consideration of diseased conditions. Radiology of the oral cavity is presented before elaborating upon the localization of foreign bodies. Radiology in obstetrics has become a definite diagnostic method and its use in the determination of pathological conditions within the urinary tract has proven invaluable.

The third portion of the text covers the subject of physiotherapy. In its pages, radiotherapy and radium therapy are included, together with high frequency currents, actinotherapy, galvanism, ionization, the sinusoidal and faradic currents. Manual therapy, thermotherapy, criotherapy, and hydrotherapy each receive their just consideration.

Supplementing the work is an extensive bibliography from which the material was obtained.

The material is presented in an interesting style, each chapter giving briefly the important points related to the subject under discussion.

THE CRIPPLED HAND AND ARM. By *Carl Beck*, M. D. Cloth. Pp. 243 with 302 illustrations. J. B. Lippincott & Co., 1925.

This monograph was prepared to present to the physician and surgeon those common abnormalities of development and most frequent results of injuries and mutilation that come into

one's daily practice. His aim in this treatise is "to deal with the deformed and crippled hand, and some of the deformities of the arm which cripple the hand," and to consider "some of the causes, the course and mechanical deformities," attempting "to show in some typical cases, how we cure or prevent many of them."

For this consideration the text is divided into two parts. In the first portion, a brief description of the anatomy and physiology of the hand precedes a discussion of the congenital deformities of the hand—specifying and illustrating the treatments to be employed. Succeeding chapters are given concerning the hand crippled by injuries, mutilations, burns and by disease. The author is to be commended on his demonstration by description and illustration his treatment of congenital deformities; but the superficial consideration of fractures of the hand and infections of the hand should be greatly expanded in an early revision.

In the second portion, the question of treatment of disturbances of the wrist, forearm, elbow and upper arm which cripples the function of the hand, together with a discussion of the problem of artificial arms and hands receives deserved consideration.

The subject undertaken is, for the most part, well handled. There are numerous case reports and an abundance of illustrations and diagrams. The author is to be commended upon the unique work that he has done for plastic surgery.

RADIOLOGICAL EXAMINATION OF THE MALE URETHRA. By *G. L. S. Kohnstam*, M. R. C. S. (Eng.), L. R. C. P. (Lond.), and *E. H. P. Cave*, M. B., B. S. (Lond.), M. R. C. S. (Eng.), L. R. C. P. (Lond.), D. M. R. E. (Camb.). Cloth. Price $5.50. Pp. 115 with 64 illustrations, William Wood, 1925.

This monograph considers a subject that has been avoided in most discussions of radiography of the genito-urinary tract. For the most part, its hasty consideration has heretofore been due to numerous unsurmountable disadvantages. In this short monograph, the authors present their method of overcoming these difficulties.

Using undiluted lipiodol as the medium and constructing an apparatus so that it could be continuously injected into the urethra while roentgenographing, the contour of the urethra could be demonstrated.

The procedure disclosed many interesting findings, particularly interesting being the variations, physiological and anatomical, occurring normally and those resulting from the effects of prostatectomy. One particular observation made, which needs confirmation, is the constrictor action of the remaining portion of the prostatic urethra following suprapubic prostatectomy functioning as the control muscle instead of the compressor urethrae.

Another interesting observation of practical value is that by injection from the external meatus fluid can be injected in bulk into the seminal vesicles by injection of the urethra. This should alter our high pressure method of urethral irrigation.

The value of such a measure can hardly be anticipated. It is the belief of no less an authority than John Thomson-Walker that it will never occupy a place comparable to ureteroscopy or cystoscopy. "In the scientific investigation of physiological and pathological conditions which obtain in the urethra and bladder neck, I would give the method a high place and look for further good work by its means."

TEXTBOOK OF ORTHOPEDIC SURGERY FOR STUDENTS OF MEDICINE. By *James Warren Sever*, M. D., Instructor in Orthopedic Surgery, Harvard Medical School; Assistant Orthopedic Surgeon, Children's Hospital, Boston; etc., Cloth. Pp. 353 with 199 illustrations. Macmillan Company, 1925.

According to the purpose of the author as expressed in the preface, this text is designed to

avoid the confusing encyclopaedic form of orthopedic texts and to present the subject in a simple easily digestible form. Few references are given and only the accepted and standard procedures of treatment are offered for consideration. The illustrations are well chosen and are well produced—the whole work being practical for the beginner in orthopedic study.

But in simplifying the material, the student is given only a superficial concept of the subject and receives an impression of the unimportance of a great many of the orthopedic conditions and practically no information on others. By the time the student takes up the subject of orthopedic surgery, he is usually a senior in the study of medicine. To present such an important subject in such an elementary manner not only underrates the student's maturity and ability but stamps the subject as one of sedentary value. Although he must master the detail of general, gynecologic, obstetric and other forms of surgery, the author does not believe it practical to present his subject in the previous detailed and encyclopaedic forms. It is the idea of the reviewer that orthopaedic problems are as essential to the knowledge of the general practitioner as the other detailed surgical subjects so emphatically stressed.

DEVELOPMENT OF OUR KNOWLEDGE OF TUBERCULOSIS. By *Lawrence F. Flick*, M. D., LL. D., Co-Organizer of the National Association for the Study and Prevention of Tuberculosis; Ex-President of the International Anti-Tuberculosis Association, etc. Cloth. Price $7.50. Pp. 783. L. F. Flick, Publisher, 738 Pine St., Philadelphia, 1925.

This book presents in encyclopaedic form the development of our knowledge of tuberculosis from ancient times to the twentieth century. Reviewing writings of the pre-Grecian writers, Dr. Flick traces the evolution of our knowledge by historic periods down to and including the demonstration of the tubercle bacillus and tuberculin by Koch. In this evolution, the author interestingly describes the therapeutics used in those days. Hippocrates advised that "you apply hot water in a small leather bottle or in a beef bladder to the side." The author also points out that antiphlogistine, or potters clay, was used in pleuritic effusions. Pliny, the Latin, records some of the treatment of phthisis, "for phthisis one has the liver of the wolf in wine, the lard of a thin sow fed on herbs, the flesh of the ass with a bouillon made from it." Other methods too numerous to mention yet equally as queer and interesting fill the pages of the text.

That for which many will censor the text is in reality its greatest asset. It is self evident that such a book can only be authentic by being a composite book compiled from the original writings and quotations of those pilgrims on medicine. The text is filled with these quotations.

The only criticism that can be lawfully made of the text is its neglect in the presentation of today's interpretation of the disease known as tuberculosis. We hope that in its revision the author will complete the good work begun. For those interested in the study of tuberculosis this text is to be recommended.

LAWS AND BOARD RULINGS. Revised to May 1, 1925. Thirty-sixth edition. Paper. Price $.80. Pp. 252. A. M. A. Press, 1925.

This little book does not quote verbatim the medical acts of the various states and provinces but gives the elements from these various practice acts and board rulings of the legal restrictions in a classified arrangement under definite heads. Such an arrangement enables the reader to find more easily that for which he is seeking. The principles governing practice in the various states are more easily compared.

These abstract laws and regulations governing the practice of medicine in the United States and provinces are arranged alphabetically by states. Under each state, a definite outline is followed: board, board of members examinations, fees, application for license, college stan-

dard, exemptions, reciprocity and definition of act.

Such a text should be of value particularly to senior medical students or those practitioners contemplating a change of residence.

PHYSICIANS' DIARY. 1926. A convenient office record book prepared especially for physicians. Pp. 140. Lehn & Fink, Inc., Publishers, 635 Greenwich St., New York.

This handy little office record is arranged so that each day's work occupies a separate page, accommodating 25 patients, including the hour, name of patient, service rendered, debtor, creditor and bill paid. At the end of the month there is a summary of the expenses for the preceding month, which when totaled is balanced against the receipts for the month. An obstetrical record and list of the narcotics dispensed during the preceding month completes each month's record. The makeup of this book is neat and follows the day book plan varied to the needs of the physician.

DAS THORAXROENTGENBILD IM FRUHESTEN KINDESALTER. Von Privatdozent Dr. *Erich Saupe*, Chief Physician in the City Hospital, Dresden-Johannestadt. Cloth. Price 10 marks. Pp. 80. J. F. Lehmanns, Verlag, Munichen, 1925.

This book is the sixteenth volume of Lehmann's Medical Atlases. It conforms in mechanical makeup to the other volumes of the Atlases and contains 27 half tone illustrations and two line drawings.

The book opens with a chapter on technique of making roentgenograms of the child's chest, a technique and an early normal which is to be remembered in later considerations.

In the discussion of pathological conditions within the thorax that may be diagnosed by means of the roentgen ray, bone diseases receive first consideration, then the diaphragm, followed by diseases of the heart and great vessels, thymus, mediastinum, lungs, pleura and pneumothorax.

Following this presentation is the bibliographic sketch and index.

The second half of the book is occupied by the half tone reproductions of roentgenograms illustrating each of the diseases discussed in the text. The style of the presentation is clear, with emphasis on the important points in the diagnosis of each condition described.

INTERNATIONAL ABSTRACTS

CUTANEOUS SYSTEM

ROENTGENOTHERAPY

Roentgen Ray Therapy. Harold G. F. Edwards, M. D., New Orleans M. & S. J., 78:28-32, July, 1925.

After a hurried review of the history of the roentgen rays and their biological action, the author briefly enumerates those conditions in which their therapeutic principles have been applied.

In the treatment of the skin and superficial tissues, the roentgen ray has proven valuable. Acne, with the possible exception of the pustular type, responds very admirably to weekly fractional dosage of $\frac{1}{8}$ to $\frac{1}{4}$ skin dose, filtered, over a period of one to two months. Carbunculosis and furunculosis, corns, keloids, and verruca are frequently responsive to radiation. With acute eczema subfractional treatments of unfiltered rays at weekly intervals afford the best

results, while with the chronic types semi-intensive weekly filtered irradiations may be administered.

Lymphoid structures respond favorably to roentgen irradiation. A temporary "cure" may be obtained in the majority of Hodgkins' disease, while in hypertrophied tonsils and adenoids the results are permanent. In hyperthyroidism the roentgen ray has proven its value and should receive consideration together with surgery and medicine—the measure used depending upon the indications presented by the individual case. Thymic enlargement is relieved after a few exposures, and tuberculous cervical adenitis is definitely benefited.

In the treatment of epitheliomas of the skin, whatever the type, effort should be directed towards destroying the cells within as short a time as possible. A permanent cure can be expected in from 85 to 95 per cent of the basal-cell epitheliomas or rodent ulcers. Squamous-cell epitheliomata metastasize rapidly, so an early diagnosis is essential.

Deep roentgen therapy has attained a definite place in our therapeutic methods. By its use hemorrhagic metropathies, uterine fibromas, carcinomas of the cervix and breast, leukemias and sarcomas are benefited.

NEVI

Radium Treatment of Vascular Nevi. Charles Mallory Williams, M. D., and Eugene F. Traub, M. D., Arch. of Ped., June, 1925.

The authors classify vascular nevi into four classes:

1. Flat, superficial vascular nevi, level with the skin, which can be made to disappear on pressure.

(a) Dark purple or port wine mark.

(b) Very light pink or "bluish-like" mark, most frequently observed on the nape of the neck, where they state it should never be treated.

(c) Nevus araneus or spider nevus.

2. Flat, deeply infiltrating vascular nevi, level with the skin, that usually cannot be made to disappear on pressure.

3. Raised, soft vascular nevi. These tumors are the "cavernous angiomata" and are sometimes pulsatile and erectile.

(a) Those covered with normal or white skin through which the purplish color of the tumor is visible to a greater or less extent.

(b) Lesions deep purple in color, with either a smooth or papillomatous surface.

(c) The fiery red strawberry colored mark.

4. Deep subcutaneous and submucous angiomatous tumors.

They conclude:

1. Radium is the best single agent in the treatment of vascular nevi.

2. Those lesions not suitable for radium in Types 1 and 2 are best treated with either Kromayer light under pressure or actual cautery point. In Types 3 and 4 either cautery or surgical excision offers the best alterative.

3. Except as specified, an erythema should never be produced with radium if the best cosmetic effect possible is to be secured.

4. Radium, though time consuming and expensive—its chief disadvantages—may be employed before surgery is deemed advisable. It is possible to apply it in locations, as for example, eyelid, lip, etc., where other methods are contra-indicated.

5. Bleeding is not a contra-indication to radium; in fact, it may be promptly checked and the healing of ulcers (not infected) may be promoted.

6. Adults respond poorly to radiation, comparatively speaking—lesions which in infancy would have rapidly melted away require tremendous dosage before being favorably influenced.

ORBITAL EPITHELIOMA

Importance of Early Treatment of Epithelioma About the Orbit. M. F. Engman, M. D., and J. S. Kimbrough, M. D., Illinois Med. J., 47:212-218, March, 1925.

Any operative procedure, whether it be done with the knife, cautery, acid, x ray or radium, unless it thoroughly eradicates all the cancerous tissue, will prove an irritant and stimulant to those cells remaining. Most frequently when the patients have appeared to the author for consultation, the disease is advanced, generally due to the irritating effects of the various remedies inadequately applied.

Rapid local extension is the rule after the growth has begun to crust over or ulcerate, and when this occurs extension to the orbital cavity usually follows rapidly. It is considered a rule that when the basal cell cancer once reaches the region in and about either canthi or conjunctiva, the inner and outer wall of the orbital cavity, whichever it may be, is always invaded. When this occurs the ultimate cure of the condition is seldom accomplished without complete enucleation of the affected member, due to the fact that the marginal proliferation almost immediately occurs when the canthi are reached. In all probability, this may be due to the succulent open lymph channels.

In the past, the authors have repeatedly attempted to save the involved organ. In those cases in which the cancerous process had burrowed or hidden itself along the outer and inner wall of the orbit, attempts have been made to bury radium tubes in this region, but without very encouraging results. Holes have been bored deep into the tissues about this region to act as a bed for the reception of a 25 milligram tube of radium, allowing the radium to rest in this bed a sufficient number of milligram hours to destroy the growth. As a rule, it has been necessary to clean out the orbital cavity in order to control the progress of the growth.

Of the total number of 3,172 cancer cases entering the Barnard Free Skin and Cancer Hospital at St. Louis from 1905 to January, 1921, 980, or 34.69 per cent of them, were on the face. Of the 980 cancers of the face, 10 per cent occurred about the eye, upon the upper and lower lids, or about the inner or outer canthi, or near the eye but upon the temple. Of the 67 cases of cancer of the temple, 16, or 23.8 per cent, finally invaded the orbit.

URTICARIA

Urticaria Pigmentosa With Hyperplasia of the Thymus Gland. Lester Hollander, M. D., Arch. Dermat. and Syphil., 11: 611-622, May, 1925.

Two consecutive cases of urticaria pigmentosa are described by the writer in which an enlarged thymus gland was demonstrated by the roentgen ray examination. A careful study of these cases showed a similarity between status thymicolymphaticus and urticaria pigmentosa. Because of this similarity, and the association of thymic hyperplasia with the cutaneous manifestation, it is suggested that further study may place the dermatological disease, urticaria pigmentosa, in a definite endocrine group of diseases.

In the treatment of these conditions, application of radium to the enlarged thymus resulted in involution of the urticaria pigmentosa.

Urticaria Solaris. L. G. Beinhauer, M. D., Arch. Dermat. and Syphil., 12:62-68, July, 1925.

There have been numerous similar cases reported where skin reactions were produced by heat, cold, light and actinic rays. As a rule, these reactions were supposedly produced by one common etiological factor. The author presents a case history which seems to limit the skin reaction to one particular element and to rule out other possible etiological factors.

In the case reported a definite skin reaction is produced by exposure to the sunlight. The reaction was a typical urticarial wheal, which could be duplicated by exposure to the ultra violet rays of the mercury quartz lamp. Other attempts to produce this urticarial reaction by other measures failed, making it evident that some rays from the sun and some rays produced by the mercury quartz lamp were similar, producing the same cutaneous reaction. The author believes that this was a specific sensitization reaction of the patient's skin to the near ultra violet rays.

DENTAL ROENTGENOGRAPHY

The Dental X Ray Picture. W. A. Lurie, M. D., New Orleans M. & S. J., 78: 221-227, October, 1925.

The roentgenogram has been of the greatest aid in the detection of oral pathology. The present day search for foci of infection has found gratification in the dental roentgenograms. And in the role of disease prevention, the visualization of the dental area is imperative. It is necessary to gain an intimate knowledge of the condition of the apical and periapical areas about teeth, and the condition of the alveolar processes the dental x ray picture therein develops its greatest necessity, as a means of diagnosis, in the field of prevention.

But with the commercialization of the x ray equipment, many machines have been installed to take dental x ray pictures. Of course, there are countless numbers of expert x ray machine operators who take excellent pictures. There remains but a limited few, however, who can read these pictures and understand the value of the conditions depicted therein. It is one thing to be a good photographer, another to be a good laboratory man, and yet another to be a clinician. If dental roentgenography is to attain its full potentialities, to become an indispensable part of our armamentarium in the recognition and correction of dental pathology, this comparatively simple laboratory measure, dental roentgenography, must be accomplished by one who understands the technique to use, has the ability to interpret the pathology presented and, above all, read into and about that picture the clinical problem as it presents itself.

Physicians who earnestly desire the correct evaluation of possible dental pathology should seriously consider these things before referring a patient.

The Position of the Dental Axis in the Jaws and the Exact Adjustment of the Chief Ray in the Intraoral Method With Regard to Maxillary Irregularities. Prof. Dr. Med. A. Cieszynski, Inter. J. Orthodontia, 11:742-763, August, 1925.

The table of angle dimensions for the chief ray is considered thoroughly by the writer. His conclusions read:

1. In the various maxillary irregularities the dental axes run in a different direction from that of the Frankfort level plane.

2. The exact length of the tooth may be reproduced on the film by the rules of Cieszynski's isometry.

3. In the typical adjustment of the head the length of the tooth depends on the angle beta which is formed by the axis of the tooth and the line FH (which extends from the external auditory meatus on a level with the lower border of the orbit), also on the inclination of the film to FH (angle K).

The angle of the chief ray gamma (that is, the angle at which the chief ray slopes from the level) is then the following:

$\text{Gamma} = \text{Beta} - \frac{\text{K} - \text{Beta}}{2} - 90$ degrees from the maxilla and

$\text{Gamma} = \frac{\text{Beta} - \text{K}}{2}$ for the mandible.

4. In employing the film holder, angle beta changes.

5. The exact adjustment of the chief ray is given in tabular form. The departure from the actual length of the tooth may amount to one-tenth.

6. The farthest departure from the regularly built jaw is found in the front teeth with deep bite.

7. Roentgenograms of the mandible taken on the film in the bite position require more precision than any others.

8. In a separate table, the writer enables not only the professional radiographer, but even other members of the staff to take exact roentgenograms.

9. In taking the mandibular teeth with the film against the alveolar process the patient's head is for practical reasons so placed that the line FH runs at an angle of 45 degrees to the horizontal. This can easily be done by means of a rectangular isoscles triangle, placing it against line FH marked on the patient's face. In this manner line FH is perpendicular to the horizontal in taking the mandibular teeth in the bite position.

This simple method, however, may be applied only when the stand is fitted with anglometer for the adjustment of the chief ray.

GASTRO-INTESTINAL SYSTEM

ROENTGEN VISUALIZATION

Chronic Infection of the Gastro-Intestinal Tract: Its Roentgen Manifestations. Charles Eastmond, A. B., M. D., F. A. C. P., Am. J. Roentgenol., 13:541-544, June, 1925.

There are many chronic infections in the gastro-intestinal tract demonstrable to the critical roentgenologist that are being overlooked by the vast majority. In the stomach they occur in the form of more or less localized filling defects usually situated on the lesser curvature immediately proximal to the pylorus and seldom over one or one and a half inches in extent. Within this affected part, minute points of barium retention or local areas of exaggerated barium density may be observed. Pathologically there is demonstrated the presence of congestion, round cell infiltration and fibrosis. Such an erosive condition should be called ulcerative gastritis. Again, the pyloric antrum, instead of being emptied by a continuation of the sharp, orderly contractions of peristalsis, empties by a broad general contraction. In this condition there is a loss of elasticity of the stomach wall and the contractility of the part is greatly diminished, this "stiffening" being due to a chronic round cell infiltration and fibrosis.

Nonproductive deformities of the duodenum have been considered the result of adhesions secondary to pericholecystitis. The author considers these changes within the duodenal wall itself and that when adhesions occur they arise from the serosa of the duodenum rather than originate about the gallbladder and secondarily involve the duodenum.

Intrinsic ileitis has been grossly overlooked. On the roentgenograms, there may be a full-calibred intestine with the rugae flattened out so as to present a smooth-walled margin, or later show a diminution in size of the lumen. Such a condition is due to congestion with small, round cell infiltration, fibrosis and more or less cicatricial narrowing.

The aspect of ileocecal incompetency has not received sufficient attention.

Chronic sclerotic changes in the colon have long been recognized as the result of chronic infection of some type. The site of such lesions usually occur in the sigmoid.

It is not the intention of the writer to convey the impression that all cases of infection of the gastro-intestinal tract present lesions of this type or position, but there is a multiplicity of lesions in such a vast majority of these cases that the entire situation is aptly termed "chronic gastro-intestinal infection."

An X Ray Study of the Right Upper Quadrant Lesions. P. R. Casellas, M. D., Southwestern Med., 9:415-418, November, 1925.

In considering the subject of gallbladder disease, a description of the Graham-Cole method of visualization is outlined; but "examination of the gallbladder can be accomplished without the Graham technique, in a very satisfactory manner by a careful study with the barium meal." At this same time spasm of the pars media and pylorus can be observed, and if found present, later checked under atropin.

The extra-lumenal pressure filling defect often observed on the greater curvature side of the duodenal bulb does not always necessarily mean gallbladder disease, because the radiographic examination may be made at a time when an overfilled gallbladder is capable of producing the indentation.

Adhesions in the right upper quadrant not accompanied by gallbladder disease, although giving rise to the spastic phenomenon above mentioned, do not elicit the associated symptoms of tenderness and pain.

Then, too, one must not forget to mention the appendix, abnormally placed, either congenitally or by acquired adhesions. Fluoroscopy is here a great assistance.

Mention should be made of the pathological conditions of the liver only to speak of the inadequacy of the roentgenogram.

"The roentgenologist may be regarded by his colleagues as a consultant or as a photographer, just as he chooses. If, by the accuracy of his methods and the soundness of his judgment, he gains the confidence of his colleagues, he becomes a consultant in the medical profession. On the other hand, if he practices his specialty with commercial ideas as a primordial object, and satisfies himself with a hurried fluoroscopic examination and the taking of one or several plates without inquiring through the referring physician into the history of the case, or surrenders his right opinion to others, then he cannot complain to anyone if he is mentally excluded from the realm of the medical fraternity."

ROENTGEN DIAGNOSIS

Interpretation of Reports on Opaque Meal Examinations. Philip Parkinson, M. B., Med. J. Australia, 1:309-314, March 28, 1925.

The method of administration is so familiar with the roentgenologist that an outline of the procedure used by the author is unnecessary.

The report consists in a systematic description of the gastro-intestinal visualization as the barium meal traverses the tract. Any abnormality present in the esophagus is noted or its absence tabulated.

In reporting on the stomach, position is given first consideration: transverse, low and sagging, etc. Tone is an important point from both the surgeon's and physician's point of view. Mobility is carefully noted and associated with peristalsis. Incisura and filling defects are next observed.

The length of the duodenum is observed and any abnormality noted. Ulcers, the most common pathological condition existing in this portion of the gastro-intestinal tract, occur 95 per cent in the first portion and are noted by an irregularity or deformity of the cap. Deformities due to adhesions, veils of omentum or ulceration are to be determined. Motility is an important observation in this regard.

Lesions of the jejunum or ileum are rare. The ileocecal junction is an important landmark, owing to the close relation to the appendix. The caecum can be observed for position and motility and the appendix described if it is visualized.

An important point is brought out in the writer's conclusion: "I would enter a plea for more effort on the part of the practitioners to let the radiographer know the subsequent history of patients and the results of treatment. Such information would be invaluable in contributing

to the radiographer's knowledge, adding to his experience and increasing his efficiency."

PNEUMOPERITONEUM

Freies Gas in der Bauchhohle. Hugo Laurell, Acta Radiol., 4:590-602, December, 1925.

The roentgenological proof of free gas in the abdominal cavity may be a valuable support in the diagnosis of peritonitis, due to perforation of a gas-containing part of the stomach or intestines. But free gas can also occur in the abdominal cavity in consequence of other conditions, so that the roentgen diagnosis of perforating peritonitis after the establishment of free gas must also be built on the anamnesis, clinical data and other roentgen signs.

Free gas can also be met with during the weeks immediately following an abdominal operation, and, also, after a laparoscopy and a previously applied pneumoperitoneum: this last may have been an intentional or an unintentional one (arisen in the attempt to apply a pneumothorax).

Free gas can also arise as the consequence of the bursting of a gasbubble in pneumotosis cystoides intestinorum, and possibly also after the bursting of interstitial subserous bubbles of other etiology.

Free gas in large amounts can occur through the influence of gas-forming bacteria, and also when the peritoneum shows an inflammatory irritation of a small and limited area. It may also occur when a gunshot has lodged in the liver, which has given rise to a gas abscess or a gasphlegmone.

Intestines lying between the diaphragm and the liver (including the colon) may lead to confusion with free gas on a superficial examination. Such an interposition may arise not only when some part of the gut is abnormally distended with gas, but also when there are intramural gasbubbles, as in cases of pneumotosis cystoides intestinorum. Moreover, subserous bubbles below the diaphragm, where such bubbles have been observed in rare cases of pneumatosis, may give rise to confusion. We must also think of subdiaphragmatic interstitial emphysemal bubbles of other origin and of retroperitoneal gasphlegmones which reach as far as the under surface of the diaphragm.

It may be possible that occasional air bubbles remaining in the abdominal cavity after an operation, or having reached there in connection with perforation, may not cause the spread of the microbes in the abdominal cavity, for instance in the subphrenic cavity through the bubbles moving from one place to another when the position of the body is changed.

In diffuse peritonitis with free gas a number of roentgenological observations may be made, such as diminished movement of the diaphragm, a secondary pleuritis—often only very slight, but none the less an important sign—intestinal obstruction and signs of slight exudation in the abdominal cavity.

The roentgen examination of free gas can be carried out quickly and with little pain. It is only necessary to turn the patient lying in his bed on to one side, if possible the left, and to transilluminate or to take a plate of the highest part of the abdomen with the rays horizontal.

PSAMMOMA

X Ray Examination and Treatment in a Case of Psammous, Peritoneal Papilloma. Chr. I. Baastrup and Einar Nielsen, Acta Radiol., 4:603-607, December, 1925.

In all probability this is the first description of the examination and treatment by the roentgen rays of a psammoma in the peritoneum. The case is particularly interesting because the roentgen treatment had a most markedly beneficient effect as regards the tumor, which had already recurred very violently twice in spite of having previously been operated on, also twice—the first time in connection with a salpingectomy, the second time with extirpation of the uterus.

It is supposed that the remarkedly fine result of the roentgen treatment must be ascribed to the calcareous nature of the psammous elements, whose presence has presumably given rise to abundant and appropriate secondary rays.

DIAPHRAGM

Diaphragmatic Hernia. Carl A. Hedblom, M. D., J. A. M. A., 85:947-953, Sept. 26, 1925.

In the differential diagnosis, chief reliance is to be placed on the roentgen ray demonstration of an abdominal viscus in the thorax following administration of a meal or enema opaque to the roentgen ray. Failure to demonstrate the hernia roentgenologically may be due to spontaneous temporary reduction, to the failure of the opaque substance to enter the herniated viscus or to the presence of a solid viscus only, such as omentum in the hernia.

Some Normal Variations and Pathological Conditions of the Diaphragm. Leon Theodore Le Wald, M. D., Am. J. Roentgenol., 13:447-451, May, 1925.

The diaphragm is not an essential structure of the vertebrate body, asserts the author, who then proceeds to argue that this structure is completely absent in all animals up to mammals.

In the development of the diaphragm there may be a deficiency in the musculature. This is particularly apt to occur on the left side and produce a congenital elevation of the diaphragm which is also known as eventration. Occasionally eventration is present on both sides, in which case it is usually associated with congenital dilatation of the colon.

In determining the presence of subphrenic abscess, roentgen examination is necessary. To gain the maximum information it is necessary to examine the patient in at least two positions, one of which should be the upright if possible. If the patient is too ill, in addition to the dorsal exposure, a lateral exposure may show the fluid level in cases containing air.

When gas is present with the exudate, it is essential that the roentgenograms be taken in various positions in order to obtain fluid level; but it must be remembered that a fluid level due to the stomach contents may closely simulate a subphrenic abscess. Abscess of the lung or a localized collection of fluid in the chest cavity may simulate subphrenic abscess, but a lateral exposure will usually clear up the diagnosis. Perirenal abscess may simulate subphrenic abscess, but there would usually be an elevation of the diaphragm. In hernia of the diaphragm, administration of an opaque meal will usually clear up the diagnosis.

It is the contention of the writer that (1), the preoperative diagnosis of subphrenic abscess can be made with certainty only by roentgenological examination; (2), lateral roentgenograms are essential in making the diagnosis of subphrenic abscess; and (3), the possibility of the presence of eventration of the diaphragm should always be considered in roentgenological examinations for subphrenic abscess.

RESPIRATORY SYSTEM

Some of the Commoner Diseases of the Chest in Early Life. N. C. Wonack, M. D., New Orleans M. & S. J., 78: 453-456, Jan., 1926.

Chest pathology in early life is assuming more importance as our methods of diagnoses improve. One of the more valuable additions that have been made to our diagnostic armamentarium is the roentgen ray. By its application, hyperplasia of the thymus, Hodgkins' disease, tuberculosis and the pneumonias may be observed.

The presence of an enlarged thymus in the newborn is not infrequent. Only a small percentage of these enlarged types show any symptoms and the hyperplasia would not be detected unless under routine examination by the roentgen ray. In those cases not pathological, the signs and symptoms of short, thick neck, respiratory embarrassment, stridor and cyanosis on exertion are fairly definite, the percussion note is dull and the fluoroscopic and radiographic examinations establish the diagnosis.

The author quotes Wessler and Jaches in considering that in infants more than two months old the presence of abnormal masses in the superior mediastinum should be interpreted as tuberculous tracheal and bronchial glands rather than an enlarged thymus. They consider the actual enlargement of the thymus gland as a relatively rare occurrence while the incidence of tuberculous tracheo-bronchial glands is very common.

The roentgen ray has given a new impetus to the study of pulmonary tuberculosis in infancy and in early life. As the primary lesion usually begins in the parenchyma of the lung and is so unattended by symptoms as to escape detection, it is not until involvement of the trachael and bronchial glands that the real symptoms of the disease develop. In those cases where the primary infection is massive and virulent, the clinical picture of infantile phthisis may occur, resulting in early death, but in the experience of the author this is rare, practically all cases assuming the secondary or glandular type and becoming chronic. A not infrequent feature of this massive glandular infection during the subacute stage is that, at regular intervals, rupture of the lymph node into the surrounding structure occurs, setting up an atypical pneumonia. This, the writer believes, accounts for many of the patients who boast of from two to five attacks of pneumonia. Others may be explained on cardiac pathology.

The roentgen ray here again plays a prominent part in clearing up so-called concealed pneumonias. In the diagnosis of lobar pneumonia, the x ray will anticipate the diagnosis from twenty-four to forty-eight hours before the physical signs are sufficiently developed to detect the disease. In cases of broncho-pneumonia, unless the technique is perfect, the roentgen ray will naturally not be so helpful.

Hodgkins' disease is essentially a lymph adenoma and early involves the lymphatics of the lung tissue. Its diagnosis is not difficult except in the earliest stages, when the pulmonary picture closely simulates glandular tuberculosis; however, the universal glandular involvement, the tendency to fibrous matting of superficial glands, the rapid course, the splenic enlargement, the negative Pirquet test, all serve to make the diagnosis clear.

Roentgen Therapy in Surgical Tuberculosis. G. A. Wetterstrand, M. D., Acta Radiolog., 4:528-540, Dec., 1925.

The writer gives an account of the experiments he has made and the results he has obtained in the roentgen treatment of surgical tuberculosis. He considers that as a method of treatment it has, roughly speaking, the same value as the other method now in use, provided that the common precautions are not neglected. In many cases it possesses the advantages that it can be employed policlinically —which is a substantial advantage from the standpoint of social economics. With regard to doses the writer considers that small ones are the best, about one-third of H. E. D., with an upper allowance of not more than 50 per cent.

A considerable part of the material presented consists of tuberculous lymphomata, with after control of 234 cases. The difference in the stages of the disease exercises little influence on the result, but the period of treatment is prolonged by the spreading and fistulous forms. A filter of 3 mm. Al or possibly ¼ mm. Cu was used. No local irritations were allowed throughout the entire course of treatment. Relapses, or possibly newly developed glands, occurred in 4 per cent. Nondangerous skin changes were

noted in 12 per cent of the cases, atrophy and teleangiectasia in 3 per cent, but necrosis was absent.

The treatment of tuberculosis peritonitis has proved extremely effective in cases where there have been no complications in the lungs or intestines. Out of 24 cases 15 were cured, with an observation period of from two to five years; transient improvements were noted in five cases, four of which were not cured.

Tuberculosis of the female genital organs reacts extremely well, and here the writer sees the best remedy at present in roentgen irradiation. Out of 10 cases, 4 which were diagnosed as hopeless when the treatment started are well; 3 have been free from symptoms for two years; 2 are still under treatment but improved, and 1 has disappeared. Postoperative irradiation is advocated by the writer.

In tuberculosis of the male genital organs too little attention is paid to roentgen therapy. Here the writer's 9 cases, 8 of epididymitis and 1 of deferens-relapse, have all been restored to health. Cases of fistulae after nephrectomy, tuberculously infected puncture canals, and generally secondary affected nests of disease in soft tissues give a good prognosis. In tuberculosis of the bones and joints also the roentgen treatment is gaining a good position and the author has hopes of further conquests for roentgenotherapy.

Intrathoracic Goiter. Alfred H. Noehren, M. D., F. A. C. S., Am. J. Surgery, 39:192-195, Aug., 1925.

The author presents the surgical viewpoint on the subject.

The symptoms of intrathoracic goiter are first hurriedly reviewed. The symptoms are usually those of pressure. The patient complains of a sense of pressure in the upper thorax and of dyspnoea, paroxysmal in character with a wheezy and sometimes audible breathing. It is often accompanied by a cough, usually of the paroxysmal type, during which time the dyspnoea is increased and the patient has a feeling of choking to death. Tracheitis frequently is present.

Physical examination may give the examiner a clew to the diagnosis, but the roentgen examination of the chest is of the greatest help and should be made in every case. It shows a shadow in the upper part of the chest, which must, however, be differentiated from other mediastinal tumors, aneurism of the aorta and lesions of the lung. The shadow of goiter may be recognized by its location, its shade, and often by the fact that it moves with respiration. It is intimately connected with that of the trachea and is higher in the chest than that of an aortic aneurism, but often continuous with it. This shadow may be very indefinite, but the outline of the trachea usually shows quite clearly. It may deviate to one side or the other, or to both sides like the letter "s," or be compressed, forming the so-called sabersheath trachea.

The only treatment for intrathoracic goiter, says the writer, is surgical. "Medical treatment with iodine is dangerous, because most of these goiters are adenomatous, and we know that it is dangerous to give iodine in cases of adenoma. .....X ray treatment, too, is uncertain and not without danger. It is difficult to measure the dose; it may do harm to other structures and it causes adhesions which make subsequent operation more difficult. Some roentgenologists are very enthusiastic and report cases where relief from pressure symptoms has been obtained, but what guarantee is there that the goiter will not grow again, or that it will not become toxic or malignant?"

RESEARCH

An Experimental Study of the Markings Seen in Roentgenograms of the Lungs of Normal Dogs. W. James Marquis, M. D., Am. J. Roentgenol., 14:247-250, September, 1925.

1. In the lungs of normal dogs the walls of the main bronchi at the hilus only may cast a shadow in the roentgenogram.

2. The bronchial walls in the outer portions of the pulmonary fields do not cause a shadow.

3. In roentgenograms of the lungs of normal dogs, the broad solid ramifying shadows seen radiating out from the hilus are caused in the main by the walls of the vessels and the blood they contain.

CIRCULATORY SYSTEM

Hepatic and Cardial Syndrome. William Martin, M. D., Am. J. Electroth., 43: 163-177, May, 1925.

It is the object of the author in this dissertation to call attention to the fallacy of the statement so often made—that hepatic engorgement is the result of cardiac disease. It is the opinion of the author that the reverse is most often true. For his explanation of this phenomenon, seven case reports are presented with numerous roentgenographic illustrations. Roentgenographic computation forms the basis for his contention.

HODGKINS' DISEASE

X Ray Treatment of Hodgkins' Disease. D. J. Steenhuis, M. D., Nederl. Tijdschr. v. Geneesk., 1398, March 28, 1925.

In the treatment of Hodgkins' disease the author bases his conclusions on observations made from twelve cases treated with the x rays, six of which were males and six females. The ages ranged from sixteen to fifty-eight, the majority being between sixteen and thirty years.

The duration of the disease varied considerably. The duration of the treatment was for the most part two courses of treatment with an interval of two or more months between the courses. The results obtained were for the most part encouraging. Two were excluded from his consideration because of insufficient treatment. Of the remaining ten, four made a complete recovery, while six showed an initial improvement but soon had a recurrence which ended fatally. The length of time embodied in this complete recovery was not produced.

It was found that lymphomata were responsive to the roentgen ray, although the sarcoma or leukaemic tumors disappeared more rapidly. Microscopically the cells of the glands that had been irradiated showed a disappearance or degeneration of all the abnormal cells and being replaced by granulation tissue, which finally became converted into connective tissue, the normal process of any inflammation. The rapidity with which this process progressed was emphasized. Changes could be noted in the blood picture. No direct effect was exhibited on the red blood cells, but a decided influence was manifest on the white blood corpuscles. There was a rapid diminution of the lymphocytes and polymorphonuclear leukocytes, a transient or lasting leukopenia resulting according to the severity of the treatment. In the spleen changes were noted. After a preliminary enlargement the organ became much smaller.

In the application of roentgen irradiation to the whole trunk in the treatment of Hodgkins' disease, the author is a strong advocate of vigorous treatment.

LYMPHOGRANULOMA

La Lymphogranulomatose Maligne. Dr. N. Voorhaeve, Acta Radiol., 4:567-589, December, 1925.

After a critical review of the literature, the author gives the results of the radiological treatment of 19 far advanced cases of malignant lymphogranuloma, the diagnosis having been confirmed by histological examination. It is stated that very much favorable results can be obtained than is generally believed.

An account is given of the principles by which a rational radiological therapy should be guided and of the manner of application. The importance of treating each local affection with sufficiently large doses is particularly emphasized, as well as treating recurrences as soon as they appear. It is pointed out at the same time, however, how important it is not to expose tissues, remaining healed after treatment, to more radiations than is absolutely necessary.

Attention is directed to several important points with regard to the treatment, as for example, the frequent occurrence of the affection in mediastinal and abdominal glands; the degree of leucopenia caused by the treatment and which may be quite marked without giving rise to any permanent damage; the recognition of recurrences; the influence of the radiations on the temperature and its significance for the diagnosis; the circumstances unfavorable for the prognosis and the contra-indications for treatment.

The importance of taking sections for histological examinations is extensively considered. Examination of postmortem material often show that histological examinations during life do not, in certain cases, permit of a diagnosis of malignant lymphogranuloma.

The causation of this is being dealt with, as well as the possibility of bringing about an amelioration of this state of affairs.

ROENTGEN SYNCHRONIZATION

Automatic Synchronization of Roentgen Ray Exposures. F. Maurice McPherran, B. A., M. B., and Charles N. Weyl, B. S., Am. J. Med. Sci., 169:510-516, April, 1925.

Roentgen ray records of the heart and lungs lack in definition and in comparability, by reason of cardiovascular movement.

In this article the authors describe a method whereby exposures may be made at any selected phase of the cardiac cycle. In this manner, systolic and diastolic cardiac outlines are reproducible at will. Pulmonary records can be made when the cadiovascular movement is at the minimum.

CROWN GALL TISSUE

The Effects of Radium Emanation on the Crown Gall Tissue. Michael Levine, Ph.D., Am. J. Roentgenol., 14:221-233, September, 1925.

Short exposures of crown gall tissue to small doses of radium emanation, 0.1 to 0.6 mc., sealed in glass capillaries which are implanted in the crown gall tissue, produce little effect on the surrounding tissues.

Longer exposures and larger doses of the same active substance induce necrosis of the tissues immediately surrounding the tissue extending progressively to a radius of 0.5 to 5 mm.

The visible microscopic effects resulting from the unfiltered irradiation of radium emanation appear to be caustic in effect.

The general effects produced by radium emanation on crown gall are similar to those produced in normal somatic plant tissue.

Further studies which tend to eliminate the effects of the beta and secondary rays on the tissue should be undertaken.

FRACTURES

Twenty-five Years of Fractures. Frederick T. Wright, M. D., F. A. C. S., and Carl Lund, M. D., Southwestern Med., 9: 300-302, August, 1925.

With few exceptions, the authors not only fluoroscope, but make films of their fractures. The fluoroscope may give reliable information 95 per cent of the time, but to be sure that nothing is being overlooked and to afford opportunity for a more deliberate study, films are necessary. When a diagnosis is made, the fluoroscope may be of great assistance in making proper reduction. When this is accomplished, final films complete the routine, not only to check the re-

sult, but to furnish a permanent record. We consider it necessary to take a picture in any severe contusion or supposed sprain of the wrist, hand, ankle or foot, even though the usual signs of fracture be lacking. Frequently a film has shown a crack in a digit or in the end of one of the long bones which might otherwise have escaped observation.

Fractures of the Pelvis. Z. H. McClanahan, Colorado Med., 24:422-426, December, 1925.

Before the advent of the roentgen ray, only obvious and severe fractures of the pelvis could be accurately diagnosed and labeled. Many functional defects were labeled as sacro-iliac subluxations and various other terms that could not definitely be proven nor disproved. With the advent of the roentgen ray, many of these functional disorders have been demonstrated as solution of the continuity of the bone, but many are still labeled in undisputable and unprovable terms.

In his article, the author outlines the results that may occur from fractures of the bony pelvis.

Fractures of the Elbow. E. J. Cummins, M. D., Southwestern Med., 9:418-421, November, 1925.

Diagnosis of fracture of the elbow can usually be made by a careful examination and elicitation of the symptoms; but the diagnosis of the exact type of fracture and the displacement is often impossible without the use of the roentgen ray.

In the reduction of fractures of the elbow the fluoroscope is the most efficacious of aids, the patient being controlled under anesthesia.

RESEARCH

ROENTGEN ADMINISTRATION

An Objective Method for the Administration of X Rays. G. Failla, M. D., Acta Radiologica, 4:85-128, May, 1925.

The following steps are advocated by the author in the administration of x ray treatments:

1. Making a contour chart of the patient's body at the tumor level.

2. Locating the area of the probable tumor invasion on the contour chart.

3. Decide what doses to give the tumor and surrounding tissues, and what parts, if any, should be protected as much as feasible.

4. Determining the position, number and attributes of the radiation beams which will be required for the desired treatment.

5. Estimating the distribution of radiation within the patient's body.

6. Reproducing in the x ray room the treatment mapped out on the contour chart.

This paper deals more in detail with the last named method of the process. A geometrical method is described whereby the patient and the tube may be placed in the proper relative positions to duplicate the treatment conditions specified in the contour chart. The essential requisites of the treatment room equipment are enumerated and a convenient arrangement is advocated. The actual procedure is outlined for typical cases.

A discussion of the many errors which limit the accuracy of the geometrical contour method are analyzed and experimental checks are given.

The advantages of this method are set forth. Special stress is placed upon its objectiveness.

The method usually used for the localization of the tumor on the patient's contour chart is discussed. It makes use of a projection lantern which superimposes the corresponding anatomical cross section on the contour chart with the proper magnification to insure a closer incidence

of the two outlines. The view of the organs in their relative positions facilitates the localization of the tumor area on the chart.

FILTER

A Preliminary Report on the Use of an Absorbable Filter With Bare Tubes of Radium Emanation. Arthur C. Heublein, M. D., and Douglas Quick, M. B., Am. J. Roentgenol., 14:116-121, August, 1925.

The experimenters have attempted to improve upon the Janeway technique, which has the advantages of simplicity and accuracy of application, even distribution of the radiation, prolonged irradiation and negligible amount of trauma, over other methods. It has, however, its disadvantages, causing occasional neuritis, hemorrhage, bone necrosis or perforation of a hollow viscus. The object of the workers is to eliminate hospitalization and trauma.

They have conceived of using an absorbable material to filter out the soft beta rays. For this purpose, some form of bismuth has proven most satisfactory. A 50 per cent bismuth paste was used. For the introduction of the absorbable filtration material, a needle was devised, divided in its mid-portion, but otherwise similar to the present emanation needle now in use. A syringe resembling somewhat the grease gun commonly used in lubricating motor cars was threaded to fit the needle. By this means the needle was filled with the absorbable filtration material; the syringe was then detached, the needle separated, a bare tube inserted in its mid-portion, the needle assembled and the obturator engaged. By inserting the needle and pushing the obturator home, the filtration material, with the bare tube in its mid-portion, was injected into the tumor.

Two sizes of needles are used, the smaller delivering one grain, the larger two grains of the paste. Bismuth pastes seem to show absorption of about 50 per cent of their bulk in approximately six months; however, not enough time has elapsed for positive of their absorption.

Forty-five carcinomas have been treated by the writers (33 intraoral, 2 rectal, 1 cervical, 2 prostatic, 1 breast, 6 glands of the neck). Of the 33 intraoral, 11 or 33⅓ per cent, show no slough whatsoever; 6 or 18 per cent, very little slough; 11 or 33⅓ per cent, sloughed to about the same degree as with bare tubes alone; 4 cases are too recent to report. Of two rectal cases with moderately large growths, one showed no slough following heavy dosage. One cervical and two prostatic cases showed no demonstrable slough. In one recurrent breast carcinoma and six nodes of the neck, tubes of approximately two mc. each were used with no untoward results.

It appears that their efforts to improve the Janeway method were not in vain.

OPTIC MEASUREMENT

The Precise Roentgenography and Measurement of the Optical Canal. Harry A. Goalwin, B. S., M. E., M. D., Am. J. Roentgenol., 13:480-484, May, 1925.

A precise roentgenogram of the optic canal cannot be obtained without a knowledge of the direction of the axis of that canal. The determination of this direction and the placement of the head in this, as in all cranial roentgenography, should be actually measured, never estimated. The calculation of the actual from the roentgenographic dimensions of the optic canal requires a knowledge of the size of the focal spot of the tube used, the distances of the focal spot and of the optic canal from the plate. At least two diameters should be measured and calculated.